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W. M. McD STONE

SOWREY AND CORN SPECIALIST

200 W. 11th St. - AGRIUM, OHIO

1916

RECEIVED
★ MAR 3 1916 ★
Farmers' Cooperative Development
NORTH AND WESTERN STATES

"THE RESULT"
STONE'S EUREKA
ENLAGE CORN
(SEE BACK COVER FOR
THE CAUSE)

SQUARE DEAL

The above is our rule and motto for business conduct. Or it can be expressed even better as follows: "Whatsoever ye would that men should do to you do ye even so to them." We therefore try to give to all inquirers, whether they are customers or not, just as friendly and as courteous treatment as possible, to furnish our customers the very best quality of seed that we can either grow ourselves or have grown for our trade, to put up orders carefully and to make shipments as promptly as we can do so, and to charge our customers a price as fair to them as to ourselves.



SOYBEAN-CORN ENSILAGE.

This shows a field of Stone's Ensilage Corn and Peking Soys. This method of growing the balanced live-stock ration is now being practiced by a large number of our most progressive customers.



CAUSE=====RESULT

OR

*Agricultural Lime, Inoculated Legumes
and Successful Agriculture*

1916

BOOK



Stone's Roosevelt Soys

Northern Ohio Acclimated Farm Seeds

WM. McD. STONE
SOYBEAN AND CORN SPECIALIST
ATWATER, Portage Co., OHIO

FAIRVIEW FARM—

HIGH PRODUCING REGISTERED JERSEY CATTLE

PURE BRED PROLIFIC BERKSHIRE SWINE

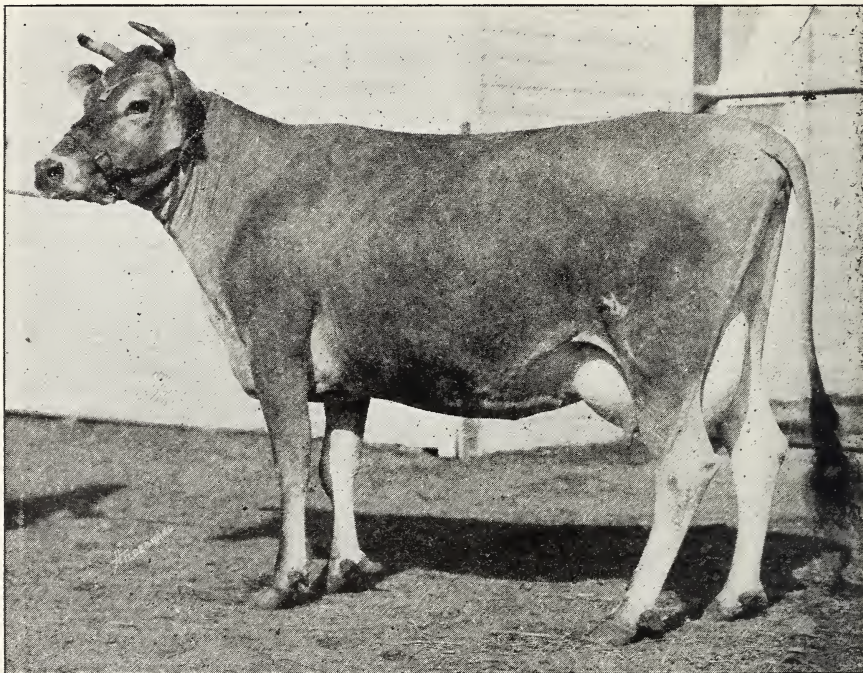
RAYMOND L. PIKE, Proprietor

Geneva, Ohio, January 22, 1916

Mr. Wm. McD. Stone,
Atwater, Ohio.

Dear Sir:

We are sending you under separate cover a photo of one of our cows that finished yearly test recently. This cow, Fontaine's Carrie of Westonook 265660, is a four year old and made 615.65 lbs. fat, 724.3 lbs butter, 85% fat from 10245.0 lbs. milk in 365 days. Average test 6.01%. This cow carried calf 215 days during test. We have a junior three year old, Betty's Golden Julia 295524, that will finish test this month with over 13,000 lbs. milk and at least 625 lbs fat.



All our test cows (20 at the present time) were fed on crops grown from seed purchased from you, from the time we had peas and oats up to the present on soybean-corn silage. Our crop of peas and oats was wonderful and I wish we knew how many tons this cut per acre, and we certainly have the finest soybean-corn silage I ever saw.

In view of the fact that I attribute, to a considerable extent, our success in the official test work here to our green feed and silage, we have much to thank you for.

You will receive our order in the very near future for our seed for 1916 and in view of the fact that we are to have ten of the daughters of our chief herd sire, Lou's Torono 106614, (Whose dam and granddams have a Register of Merit record of 14,187 lbs. 10 oz. milk and 948 lbs. 9 oz. butter in one year) on test, we want the same excellent quality of seed that we had last year.

Trusting that you may have excellent success this coming year and assuring you of our continued patronage, we are,

Very truly yours,

FAIRVIEW FARM.

R. L. PIKE,
Owner and Manager

INTRODUCTION

For several years we have noticed that all of the agricultural authorities in America have been gradually devoting a larger share of their time to the discussion of two very important and far-reaching subjects, subjects which are rapidly becoming of great consequence.

The first of these subjects is the great question or problem of not only preserving but from vital necessity, increasing the supply of available plant-food nitrogen in our American soils.

Of phosphorus we have not only in our soils a fair supply but in our American phosphate mines already enough in sight to last for hundreds of years. While we have no developed potash mines, as in Germany's case, yet our average American soils contain an enormous quantity of potash, much more so than the other elements nitrogen and phosphorus, and though most of it is in an unavailable form, yet with good farming methods a good supply will be made available as a plant food.

Nitrogen in a form available as a plant food is one of the most necessary of all plant foods, the one in least supply, and consequently the highest-priced of all to buy.

The other great problem is the problem of securing a fairly cheap and abundant source of digestible protein food, so absolutely necessary for the proper development of the live stock industry on the millions of American farms.

Many of the so-called successful American farmers of the past generation made their farms rich and productive at the expense of the soil of the neighboring farms, from whose owners they purchased all their surplus forage and grain for use on their own farms. We have often heard the expression "Rob Peter to pay Paul," but what about these men who each robbed perhaps six or eight farms in order to make his own farm rich. The standard set forth for the successful farmer of today is to make his own farm much more productive but by much better methods than the wholesale robbery of the fertility of other farms.

Perhaps, farmers as a class have not advanced so far in the solution of the protein-supply problem as they have in the other. Yet since nitrogen bears much the same relation to the plant which does protein to animal life, and protein is largely nitrogen, really then the two are so bound together that the solution of one is very apt to be the solution of the other. When linseed oil cake, bran and middlings and such protein by-products could be bought for almost a song it was a rather difficult matter to induce a lot of old farmers to go to any special work or expense to grow their protein for the livestock. A large proportion of them, not a very great many years ago, did not know what the word "protein" meant. But the steadily increasing prices of all the different protein grain foods are finally forcing most live stock growers into such a position that they are almost compelled to study the problem and to attempt to work out some satisfactory solution to it.

It is to our very much esteemed friend, Dr. Chas. E. Thorne, Director of the Ohio Agricultural Experiment Station at Wooster, O., that we owe the start of the inspiration to engage in the culture of the soybean or soy as it is often called.

This plant has not only been the means directly of largely solving the two great problems of American agriculture but indirectly, through a study of its great possibilities a great army of American farmers have been induced to give far more interest than formerly to the scientific and practical use of the other legumes. At the time Dr. Thorne advised us to grow soybeans in place of oats in our rotation of crops, very few Ohio farmers, comparatively speaking, seemed to know anything at all about the crop. To show what a wonderful change is coming over the United States, in the attitude of farmers, generally speaking, towards the growing of new kinds of crops, it is reported by the U. S. Dept. of Agriculture that through the missionary efforts of their county agricultural agents alone, over 78,000 more acres of soybeans have been grown; we presume in 1915.

Considering the fact that the soybean was practically unknown to American farmers only five or six years ago, its growth into such popularity among the more conservative class of men in this country has been nothing short of remarkable.

It is now acknowledged by practically all of the world's great agricultural authorities that:

Any system of profitable and permanent agriculture, in the fullest meaning of the term, must have for its foundation principle the universal culture of thrifty, well inoculated legumes.

The three greatest requisites in the growing of such crops are legume seeds, bacterial inoculation for the seeds and agricultural lime with which to sweeten the soil. We are better equipped to furnish all of these than is any other establishment in America.

THE SOYBEAN AND PROTEIN PROBLEM

On account of the tremendous increase in population of the large cities all over this country, most of the live stock farms have been changing very rapidly from cattle-growing to dairy farms. This is especially true in the north-east quarter of the U. S. While an abundance of protein food is necessary for best results in any kind of live stock production yet a large proportion of stockmen were not trying very hard to get best results, so they fed their cattle mostly corn and timothy hay, with some clover when they happened to have some. Now in changing to dairying most of them have already found out that it is absolutely necessary to have a good liberal supply of protein grain and forage in order to secure the best results.

On the average American farm but a very small proportion of the protein feed is grown that is necessary for a proper development or growth of the live stock which the farm should keep. Only a small proportion of American farmers grow even a plentiful supply of clover hay. No high-producing dairy cow is able to secure all the protein feed which she needs, from red clover hay alone. Neither will the grains commonly grown in the past on the ordinary farm, such as corn, oats and wheat, furnish the amount or kind of protein needed to properly balance the feed ration for dairy cows



STONE'S MEDIUM GREEN SOYS.

Where then, as a rule, does the American dairyman get his protein feed? Well, he buys it in the commercial feed sacks, and helps his brother farmers to bid up, higher and higher, the prices of these feeds, put up and sold by the great milling companies of this nation. After they, the dairymen, have deducted from the amount of their cream checks, their bills for bran, linseed oil meal and other protein feeds necessary to properly balance up the dairy rations with their farm-grown timothy hay and cornfodder, they have but little cash remaining. To increase the size of the cash balances remaining from these cream checks several changes should be made in farm management.

First: Do not buy high-priced protein feed. Grow it on your farm.

Second: Feed all the farm grown feed to much better cows.

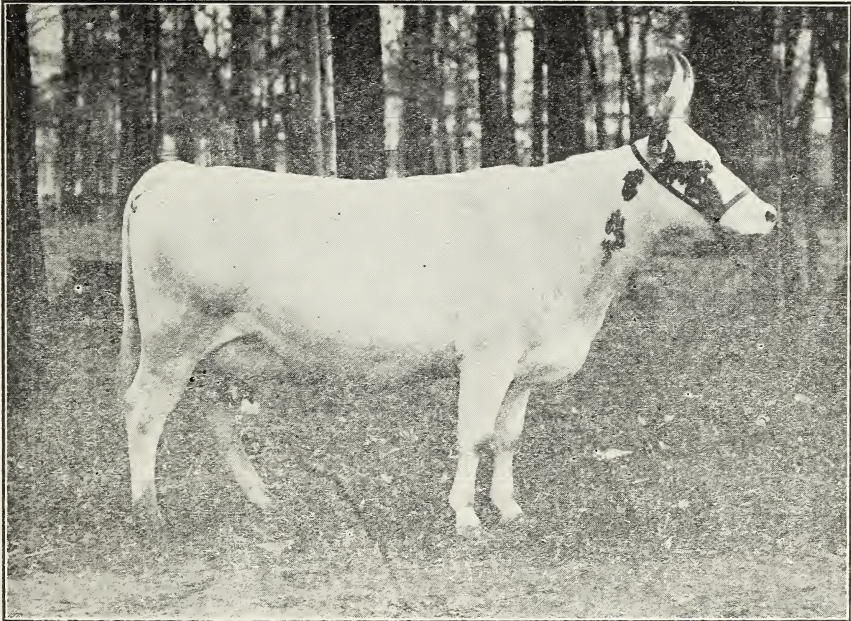
Third: Make plans to get better prices for both milk, butter and calves.

No other business could endure such systematic robbery as has the American dairy industry suffered for years. Certainly it has been the easy and generally willing prey of worthless "boarder" cows, of extortionate feed-dealers and of unscrupulous milk buyers. The dairy industry had better part with these incumbrances as soon as possible.

What crop will best furnish the rich protein feed to properly balance up the rations in connection with other farm-grown feeds? That crop is **The Soybean**.

The corn crop long ago solved the problem of furnishing the bulky carbohydrates food for dairy and beef cattle, supplementing of course by ordinary farm grown hay. The growing of soybeans is the most natural and reasonable way of producing the high-analyzing protein feed on the average American farm.

In most sections it will very handily take the place of oats in a corn, oats, wheat, clover rotation, or if the soybean ground cannot be put to wheat in time, then clover may be sown with oats the following spring, thus keeping up the four year rotation.



LESSNESSOCK BUNTIE, NO. 31685

This 2-year old Champion Ayrshire has her daily ration of Stone's Soybean Ensilage. She has a year's record of 14678 lbs. of milk and 512.4 lbs. of butter fat.

The best way to judge the value of a dairy cow is by her production of milk and butter the year round. "By their deeds shall ye know them." The advanced registry work with America's purebred dairy cattle is proving to be of enormous value in developing a genuinely profitable dairy industry. The careful professional work in this line done on South Farm and other great dairy farms should merit the greatest of commendation from all Americans, whether farmers or not.

Every dairy farmer should aim to improve his cattle by securing foundation stock from the breeders who prove the ability of their cows by actual production at the pail. Get rid of the "boarder" cows and breed up cows that will make you a good profit.

On account of the analysis of soybean grain being so high in digestible protein, over three times as much digestible protein can be raised in an acre of good soys as in an acre of good oats. Don't you think that fills the bill nicely for what the dairy-men need? We think so. The foremost dairymen in the U. S. have begun to grow soybeans in their rotation in place of oats, not only because protein grain can thus be grown cheaply, but also because they realize they should not run the unnecessary and large risk of feeding the market protein feeds, the purity and quality of which they know but very little, to valuable dairy cows, some of them worth thousands of dollars. If they can grow all the feed for these cows on the farm as they can do in a corn, soybeans, wheat, clover rotation or a corn, soybeans, oats, clover rotation they have not only eliminated a large feed bill but a larger risk of possibly injuring the health of their cattle by feeding questionable feed.

In 1908 and 1909, the Ohio Agricultural Experiment Station conducted some experiments to determine the value of soybean or alfalfa hay as a substitute for high-priced commercial protein feeds in milk and butter production. The experiments proved very conclusively that the use of milling by-products or other commercial feeds is not necessary in milk production, when soybean or alfalfa hay can be produced in fair quantities by the dairyman farmer. Soybean hay in these tests showed equal efficiency, according to its chemical analysis to the high priced commercial feeds. Read circulars 78 and 132 and bulletins 237 and 267, issued by Ohio Agricultural Experiment Station.

Winconsin, Tennessee, Indiana and other experiment stations have also conducted very careful experiments with feeding soybean hay, soybean grain and soybean straw in comparison with other feeds, which have proved the wonderful value of this plant as a food for all kinds of live stock. Write to the U. S. Dept. of Agriculture at Washington, D. C., and request them to send you their bulletin on the soybean and find out what a wonderful live-stock food is the soybean both for grain, hay, straw, soiling crop or ensilage.

Valuable as a protein feed is the soybean may be judged by comparison with other farm crops in analysis of protein as follows: Soybean grain, 36.3%; oats, 11.8%; corn, 10.6% barley, 12.4%; rye, 10.6%; buckwheat, 10%; flaxseed, 22.6%; cowpeas, 23.5%; sunflower seed, 16.3%; cotton-seed (with hulls), 19.6%; wheat, 11.9%; soybean hay, 15.4%; alfalfa, 14.3%; cowpea hay, 16.6%; peavine hay, 13.7%; vetch hay, 17%; crimson clover, 15.2%; alsike clover, 12.8%; red clover, 12.4%; orchard grass hay, 8.1%; red top, 8%; blue grass, 7.8%; mixed grasses, 7.4%; timothy, 6%; cornfodder, 5.1%; corn stover, 4.5%. Soybean silage, 4.1%; cowpea silage, 2.7%; peavine silage, 5.9%; corn silage, 1.9% to 2.2%; sorghum silage, 0.8%. The above analyses are from Bulletin No. 155, of Ohio Agricultural Station at Wooster, O. Notice the higher protein content of all the legumes in the above list, compared with the non-legumes.

When we consider that soybeans are planted after corn is planted, without interfering with that work; that from 20 to 40 (60 lb.) bushels of this rich protein grain can be grown to the acre and that from one to three tons of cured hay and as high as 12 tons of soybean silage can be grown to the acre, we begin to realize some of the wonderful possibilities of this crop. It has been found by experiment that soybeans are worth about 10% more than middlings as a hog feed. When substituted for oats in a corn and oats grain feed for lambs, they gave very much larger gains both in wool and weight of carcass than did those lambs fed corn and oats. The consumption of pounds of feed to each pound of grain was also much less with the lambs fed corn and soys.

We believe that the poultry business is going to prove one of the large bidders for the commercial soybean grain crop. Progressive poultrymen are not afraid to feed new grains if evidence is in their favor. We find that chickens love every kind of ripe soybean, regardless of size or color and the effect of eating such high protein grain soon shows in increased egg production in winter time when eggs are high.

Several of the most prominent manufacturers in the United States are now using soybean oil very largely or else exclusively in the production of special-purpose high-priced paints. Soybean oil is considered very much superior to linseed oil for such purposes and the paint produced is much more satisfactory.

Manchuria alone ships thousands of tons of soybean oil cake, the by-product of her soybean oil business, to other countries for use as dairy feed. Some of our most prominent dairymen customers on the Pacific Coasts have written to us in highest terms of the value of soybean oil cake as a dairy feed. It is fed in large quantities to dairy cattle in that part of America. Seed of over 300 varieties of soybeans have been imported from India, China, Japan, Siberia, Manchuria, and other nations by the U. S. Dept. of Agriculture and tested by it as to grain and forage yields and other qualifications. We have tied out about 50 of the best varieties and sell to our customers only those varieties which have proved to be the most satisfactory for either grain, hay, ensilage, or green manuring. The time is not far distant when but comparatively few progressive livestock farmers will not grow soybeans as one of their regular farm crops.

Soybeans for Ensilage

A large proportion of the soybeans now grown on dairy farms are cut for ensilage. This saves the whole plant; leaves, stems and grain and at a time when it contains the most digestible food. Soybeans do not make good-keeping ensilage by themselves because they are hollow-stemmed. But if mixed with corn for ensilage, the sap from the green corn will fill up these hollow stems and the silage will keep very well and will be mixed, ready for feeding.

Since soybean silage analyzes very high in protein and corn silage very low, if the two be mixed at silo-filling time at the rate of one part soys to about two parts of corn, the silage will have its protein content so largely increased that but little grain will have to be fed with it, in order to balance up feed rations properly. About five feet of the top layer of ensilage should be all corn silage.

There are three ways in which soybeans may be grown for ensilage. The first way and (we think) the best way for average conditions existing in the Corn Belt is to plant them apart from the corn and give them the same treatment as one would give if they were grown for grain production. They should be harvested if possible, just before the leaves begin to fall, using a grain binder, cutting two 28-inch rows at a round.

The soys then will not have to be planted until after corn is planted and ground is well warmed up. They can then receive just exactly the care needed for best results. The time of planting the different varieties can be gauged to suit the time at which corn is to be cut for ensilage. If corn is not cut until about October 1st,

do not plant Medium Green Soys until June 20th, or they will get too ripe for ensilage by cutting time. Roosevelt Soys can be planted about the same time. Ensilage Soys can be planted earlier, and Peking can be planted about the same time as the corn, to be ready at cutting time. Plant $\frac{1}{2}$ bushel Peking, $\frac{5}{8}$ bushel of Roosevelt, $\frac{3}{4}$ bushel Medium Green.

The second way advised by some farmers for planting soys for ensilage, is broadcasting the seed, using every feed cup in grain drill for the work, and using from three to four times as much seed per acre as used when planted in 28-inch rows. The soys will grow taller than if planted in rows; they will be easier to harvest with a binder for ensilage; they will not have to be cultivated, and possibly will add more fertility to the soil on account of more roots (to the square yard) covered with nodules. They will also give a large amount of grain and perhaps more forage if grown this way than if planted in rows.

IF!

It does not either rain or turn cold after planting or do both before the soys are large enough to shade the ground completely. In case the weather does turn bad you will have a very unsatisfactory crop. Since the possible loss is so many times greater by this method than the possible gain we do not advocate this method. Our customers may do as they see fit to do.



PEKING SOYBEANS FOR ENSILAGE.

The above shows a splendid crop of Peking Soys, partly cut by binder. These bundles of soys can be hauled to ensilage cutter at the same time that ensilage corn is hauled and the balanced ration be mixed while filling the silo.

The third way advocated is to plant them in the same rows with the corn and treat them almost as if they were corn plants. The idea is to substitute a solid growth of soybean plants from one corn stalk to the next in place of the more common sight; rows of weeds and fall grass in so many cornfields, grown for ensilage. This plan has several advantages as well as disadvantages. It is more suitable for farmers who grow the ordinary early Ohio field corn for ensilage, especially on farms in New York, Michigan and other like latitudes where ensilage is harvested earlier than in Ohio. One principal reason for this is that the soybean plants will have a better comparative show when planted with these varieties of corn than when planted with great tall ensilage corn. This plan will produce a crop to be harvested all at one time by the corn harvester, and all mixed up in the bundle to be run through the cutting box and it will take but little extra time, in fact, to plant, cultivate and harvest it.

In 1912 one of the largest soybean-corn ensilage growers in New York State carried on an experiment, growing hills of corn under the same conditions, except that he planted soybeans in with some of the hills of corn and inoculated the soys. He claims that the weight of the cornstalks in the hills where only corn was planted was only one-half as much as the weight of the cornstalks in the hills where the inoculated soys also grew.

It will pay every progressive farmer to read the remarkable bulletin, published by Cornell University Experiment Station of New York, No. 294 entitled "A Heretofore Unnoted Benefit From the Growth of Legumes." It describes experiments made there, concerning the effect on the protein analysis of timothy produced by growing it in connection with either inoculated alfalfa or inoculated red clover and the effect on the protein analysis of oats, grown in connection with Canada field peas. The effects produced were remarkable but require considerable study for thorough understanding. In brief the following results were obtained:

Timothy grown with alfalfa contained from 8% to 22% more protein than when grown alone.

Timothy grown with red clover contained 44% more protein than when grown alone.

Oats grown with field peas contained 7% to 34% more protein than oats grown alone.

All well posted farmers know that all legume crops store up supplies of nitrogen plant food in the form of tubercles or nodules on their roots during growing season, but it is very doubtful that non-legume plants growing next to legume plants could utilize any of these nodules for food while the legumes themselves were alive and growing. It was therefore very self-evident that this remarkable increase in the protein content of the non-legume must be explained by some other means.

They carried on more experiments then with soils from both limed and unlimed timothy and alfalfa plots and found that another kind of bacteria, the nitrifying kind, were doing their work of preparing nitrogen in available form as plant food at different rates in the different kinds of soils. It was found by careful tests that the nitrifying bacteria in the unlimed soil which had grown alfalfa one year before and had been kept free from any growing vegetation since were making nitrogen plant food available 130% faster than in unlimed timothy soil under same conditions.

And limed alfalfa soil was found capable of producing nitrogen food for plants (which largely makes the protein part of them) at nearly three times the speed that the unlimed timothy soil could produce it.

The experiments proved very conclusively that we ought to grow inoculated legume crops in connection with non-legumes if possible, if only for the increase in the richness of the non-legume crop, not to speak of the added tonnage per acre. In this set of experiments it was found that oats and field peas grown together produced 1000 to 1100 lbs. more hay per acre than oats grown alone.



STONE'S ROOSEVELT SOYS

The effect of the inoculated soybeans growing with the corn seems to be much like that produced by the inoculated clover with the timothy.

The disadvantages of this third method of growing soybean-corn ensilage is principally a matter of comparison. To make a close approach to a balanced ration in the silo, the ensilage should be about one-third soybeans. If the regular amount of seed corn be planted then there will not be much use in planting in the same rows with seed corn, any more than 6 quarts of Peking Soys or 3 quarts of Medium Green Soys per acre.

While this amount of soys growing with the corn will help increase the protein analysis in the silage very much, it will not furnish as large a proportion of soybeans as we think best in the silage. If the rows were only 36 inches or 32 inches apart and the corn stalks were not quite so close together in the rows, then one would have a large proportion of soys and would utilize the ground better, without materially decreasing the yield of the corn, because 28 or 30 inches is about the full width of soybean rows in good thrift.

Inoculation

We wish to emphasize this point: Be sure to inoculate the soys which you grow with your corn. Why?

1st. To help very much the growth of the soybeans, especially so if the soil is not very fertile.

2nd. To keep them from competing with the corn for the supply of the soil's nitrogen.

3rd. To help the growth of the corn.

4th. Experiments have proven that inoculated soys are richer in protein than are those not inoculated.

5th. To help the following crop in that field, by means of the nitrogen stored up on the soybean roots, when they are inoculated.

We are illustrating on front cover of this book a view of a field of Stone's Eureka Ensilage Corn, which was planted about June 25, 1914, in one of our fields which for several years in succession previously had been growing inoculated soybeans. No manure, lime or fertilizer was applied to this field during 1914, yet the crop, though late planted, yielded at the rate of 29½ tons of green feed per acre at cutting time in spite of the severe drouth lasting during summer.

The thrifty color which the corn held all during the growing season showed very plainly the presence in the soil of a plentiful supply of nitrogen available as plant food, stored there by the bacterial work of the preceding soybean crops. We have noticed the same rich dark green color in the oats and wheat crops in each of our fields, when following a soybean crop in rotation. In 1914 we harvested our champion wheat crop to date from a field of pedigreed Poole wheat planted on soybean stubble about the 1st of October, 1913. If the soybean crop be well inoculated, we believe the wheat crop following the soybean crop will be apt to yield several bushels per acre more than it would ordinarily yield.

The surest and best way to inoculate the soybean roots is by the use of soybean bacteria-inoculated soil. It can either be broadcasted over the field before planting or else sifted and drilled in with seed. It will take about 100 pounds per acre of inoculated soil, used in this way to inoculate the soys well the first year they are planted. After that the field is inoculated for soybeans, practically forever.

We sell soybean bacteria soil from one of our fields, which is wonderfully well inoculated, for inoculating this crop. This field so far as we have seen in many years has never grown any such foul weeds as white daisies, buckhorn plantain, Canada thistle, quack grass or anything of that order, so you won't run much risk of importing new weed seed from us. Protect the inoculated soil from bright sunshine, or the bacteria in it will be largely killed. If the soil gets very dry before it is used it will have the same effect on the bacteria. Since the cost of the inoculated soil, with even long freight rates added is not any more than the cost of cheap fertilizer, the gain from its use is large, and once inoculated the soil is inoculated forever, it would certainly seem to be wise to use it plentifully the first year. After that you will have all the inoculated soil you want for yourself and inoculated soil to sell to your neighbors.

The soybean bacteria under good conditions are tremendous multipliers. One hundred pounds of good soybean-bacteria-inoculated soil will inoculate well an acre of soys if the soil is sifted and run through the three cups in the fertilizer box of the grain drill corresponding to the three feed hoppers used in sowing the grain; since we advise in practically all cases planting soybeans in rows 28 inches apart, using middle and outside hoes of a 9 hoe drill and cultivating the soys once in the row with a one-horse cultivator a few times during the growing season. Under favorable conditions in three to four weeks from time that earliest cultivation is begun they will be too large for cultivation.

It would certainly be economy for our customers living over 300 miles from us to order Mulford Cultures for Soybeans and Cowpeas instead of inoculated soil and thus avoid heavy freight charges.

Methods of Planting Soybean-Corn Silage Fields

Several methods are used for planting the combination corn-soybean ensilage fields. The first method and common one is to mix the two kinds of seeds together very thoroughly and then plant them just as if they were all kernels of corn. Then sow the inoculated soil as fertilizer through the fertilizer boxes. The second method is to plant the soybeans with the corn planter, using the inoculated soil as fertilizer and then go over the field afterwards with the hand planter, planting the corn in hills along in the soybean rows.

The third method is to plant the corn first with the two-horse planter, using fertilizer in the fertilizer boxes, and then drive right over the same rows again, planting the soys very shallow and sowing the inoculated soil at the same time. The fourth method is to secure from the manufacturer of corn planters, seed-planting plates to be used instead of fertilizer cups and then plant seed corn with one set of plates and soys with the other set in the fertilizer boxes. The fifth method is to plant the cornfield first either by machine or by hand and then go over it again with a hand planter, planting the soybean hills as closely together as you prefer them. Do this directly after planting corn. Don't let the corn get the start of the soybean.

The sixth method of planting is to plant the seed corn with a two-horse corn planter using the regular feed cups for planting. The soybean seed can either be mixed with the fertilizer in the correct proportion if no inoculated soil is to be sown, or mixed with the inoculated soil in correct proportions if no fertilizer is to be sown. If it is desired to mix fertilizer and inoculated soil together as many of our customers did in the spring of 1913, then we advise our customers to use some form of non-acidulated fertilizer, such as bone or basic slag phosphate. For example; if you intend to use 100 pounds of steamed bone, 100 lbs. of inoculated soil, and 8 quarts of soy-

bean seed per acre, then mix all together very evenly and run the mixture through the fertilizer feed cups while corn is being planted through seed grain boxes. The dry fertilizer will help the soil to go through cups more easily.

It is very advisable that the soys be inoculated. On good soil, the uninoculated soys will grow apparently as well as those which are inoculated but it will be at the expense of the soil's supply of nitrogen. If soys are planted with the corn it is even more important that they be inoculated so that they will help and not hinder the growth of the corn plants; not to speak of the good which will come to the following crop. Don't plant your soys and corn while ground is cold. Don't plant over one or one and one-half inches deep. Be sure to inoculate. Soybeans can be inoculated with soybean bacteria only. No other legume bacteria will do it. Buy your seed and soil from us. Get the best and start right.

Soybeans for Hay

Many feeding experts, especially well posted on corn silage use, claim and perhaps wisely so that every farmer should either grow or purchase a plentiful supply of high protein analyzing hay, to feed to ensilage-fed live stock. Ensilage-fed cattle seem to crave some dry feed and the high protein hay not only helps to satisfy this natural craving but also furnishes one of the cheapest, best ways of balancing up the stock ration. Corn silage is very low in protein, so the hay fed to cattle should be very high in protein if possible. There is no high protein hay crop which comes so near to being a sure one as the soybean hay crop. We have never known any man to have a failure of a soybean hay crop who made any fair attempt to get one, but we have known many men making absolute failures at times in trying for clover and alfalfa hay crops.



PLANTING SOYBEANS.

Soybean seed is being sown through the middle and outside holes of the grain drill. The marker chain makes a plain mark over which to guide the tongue of grain drill. This gives rows of even width and makes cultivation easy and satisfactory.

We would advise that the soybeans be allowed to grow until pods are well formed. Then cut them and let them lay in the swathe as long as one dares to wait before leaves begin to shatter. Then rake up and bunch them in moderate sized cocks and let them stand until cured. If it rains very much during the curing period, turn the bunches upside down occasionally, so that hay exposed to wet ground will have a chance to dry and not get moldy. Don't do any unnecessary worrying about your soybean hay spoiling in wet weather. We believe that soybean hay will endure more wet weather without loss than any other kind of hay. Even if some of it gets badly bleached live stock seem to like it very much anyhow. Use same amount of seed per acre and same method in growing as one does when growing them for ensilage. A good crop should give from two to four tons of hay per acre.

THE SOYBEAN AND THE NITROGEN PROBLEM

We have spoken in a general way of the soybean crop as furnishing a solution to the problem of finding a cheap source of protein feed for live stock. Now it furnishes just about as well the answer to the question as to where to find cheap nitrogen. The cheapest and perhaps the best form in which to buy nitrogen in the fertilizer sack, is nitrate of soda. In that form nitrogen is worth 15 to 20 cents per pound. Since phosphoric acid can be bought for 4 to 5 cents per pound and if some soils need purchased potassium, it can be bought for the same price, it is very important to look after the most expensive element, nitrogen.

The scientific, practical, or common sense way to add nitrogen to our soils is to do it in Nature's own way and that is by propagating in our soils the abundant growth of nitrogen-fixing bacteria belonging to the different kinds of legumes. Soybean culture furnishes the nitrogen so very necessary for plant growth, free of charge. Winter vetch does well under some conditions, and so does alfalfa, if conditions, some of them very expensive, are fully met. Clover will do well if we have enough lime, phosphorus and humus, but we believe that the soybean will produce some kind of a crop, if inoculated, on any kind of soil, no matter how poor it is.

Another great advantage it has over the other crops we mentioned is that it is harvested and the land is improved the same year as grown. With the renting farmer this is much more important than with one who owns and farms his land. The renter must make his living the same year he plants the crop. There would be an inducement to grow soys, because there would be returns the same year, but many tenants never sow clover because they think that they will not be there to harvest it. Rented farms as a rule are not noted as being very successful clover farms.

Other things being equal we believe that the soybean comes the nearest to filling the bill correctly, for a profitable, easy growing, early maturing leguminous crop of any. We have seen them grown successfully on every kind of soil in this section. Can this be said truthfully of clover or alfalfa? Planted after all the other crops are put out in the spring, ordinarily the early maturing varieties may be harvested and the ground put to wheat in good season, without any more plowing, the summer cultivation of the soys furnishing almost a perfect seed bed for wheat.



HARVESTING SOYS FOR SEED.

Cutting the last rows of soybeans with Deering Mower, which has a platform attached to cutter bar. The crop is cut, bunched and windrowed at one operation. Part of it has already been hauled to the barn.

The question is often asked us by practical, level headed farmers, "How much nitrogen will the nitrogen-fixing bacteria on the soybean roots take from the air in one season? In a carefully conducted test by Dr. Wheeler, of Rhode Island Experiment Station, lasting 5 years, the following results were obtained by growing inoculated soybeans in certain sizes of plats, the soils of which were analyzed at the beginning and the end of the five years' experiment and the yields by the acre computed from this test.

No. of plot	Pounds of nitrogen per acre in soil and seed at the start	Pounds of nitrogen per acre removed in the five crops taken off	Pounds of nitrogen per acre in soil after five years
1	3698	1313	4908
2	3602	1317	4777
3	3602	1373	4783
4	3673	1355	4810

If the nitrogen gained per acre in soil and crops was valued at the same price per pound as the nitrogen in nitrate of soda or any other good fertilizer the average gain in nitrogen would figure at about \$75.00 per acre per year, so if we cut down the value of this nitrogen gained to only 3 cents per pound we have even then a gain of \$15.00 per acre each year. In a corn, soybeans, wheat, clover rotation or a corn, soybean, oats, clover rotation we have two very good soil builders to offset two nitrogen robbing crops. In the common corn, oats, wheat, clover, timothy rotation, we have only one builder to four soil robbing crops. Since the soybean is the easiest of all the legumes to grow and the surest of all to do well (if they are given fair treatment) we know that their culture will prove to be of tremendous value to American farmers if we consider the benefits to the soil alone.

Growing a Crop of Soys

Soybeans can be grown on almost any kind of soil in the eastern part of the United States that will grow any kind of cultivated crop, but we want our seed to go to farmers who like to do the best they know how to do when growing a crop. Now to put the directions in the fewest possible words we would advise you to plant them

on the richest field you have preferably one which was in corn last year and then spread on all the fine ground limestone you can afford after the ground is plowed in early spring and then before planting after ground is well fitted, broadcast or put in with a drill several hundred pounds of acid phosphate, steamed bone, or basic slag per acre.

Prepare a fine deep seed bed for planting and in drilling soys be sure to drill them, if possible, not over 1 or 1½ inches in depth. We advise that if you can secure good soybean bacteria-inoculated soil that you drill it in with the soys, when you plant them, using the middle and two outside seed hoppers of a 9-hoed drill for the seed and the corresponding hoppers in fertilizer box for drilling in the inoculated soil. Do not plant until ground gets well warmed up, from May 15 to July. Cultivate the soys with a one horse cultivator once in a row just as early as they can be cultivated without covering them. Cultivate once a week or every 10 days. If soil and other condition are favorable, they will make such a very rapid, vigorous growth that it will not be possible to cultivate more than four times, possibly only three times, on account of tramping the soybean plants with the horses. In harvesting soys with either an old fashioned reaper, a binder, or mower with either a wind-row attachment or else a platform, fastened to back of cutter-bar on which the plants will fall back, when cutting two rows. This platform with a little help does the best work of any machine we know of so far in harvesting. This platform we made of just one full sheet of galvanized iron, costing \$1.35. The platform has a board railing around it to keep soys from falling off until a good big heavy fork full is gathered. Practically all the seed shelled in cutting the soys is caught on this platform and saved.

We thresh our soys with a common separator using one blank concave. If the soys are pulled by hand, there will be quite a lot of dirt stirred up in threshing, but it does not seem to be at all poisonous like the dust from threshing grain, especially oats. In storing the seed be sure that it does not heat up or the germination will be much injured, perhaps all ruined. If not well dried out at threshing time, they should be spread out and shoveled over until dry, or else stored in sacks, a bushel per sack so they can be moved easily and have plenty of ventilation.

The best time in which to have soybean seed shipped is during cold winter weather. The germ life of soybean seed does not seem to be at all injured by exposure to low temperature.

We have known soybean pods to lay out on the ground all winter long and when spring frosts had buried them in the soil, the seed would sprout and grow very readily. What small loss in germination we have ever had in soybean seed, has been caused by either heating or molding in warm muggy or damp weather.



MEDIUM GREEN SOYBEAN SEED.

Hauling in the 1915 soybean crop on Lone Elm Farm, Atwater, O. Such a load will thresh out from 20 to 30 bushels of fancy quality seed.

Soybean Varieties

In the descriptions we give of the varieties of soybean seed that we grow and sell, you may find some statements contrary to what other seedsmen have to say about them. As a general proposition those seedsmen who sell soybean seed but do not grow it know but very little of the merits or demerits of the different varieties. There is such a very remarkable difference in the growth and characteristics of the different varieties of soybeans that the only reliable course for a non-posted farmer to follow who wishes to grow soys for some particular purpose, is to purchase his seed from a farmer seedsmen, who grows his seed and knows them as he knows his horses and cattle.

Ignorant or unscrupulous city seed firms have in past years sold to Northern farmers thousands of bushels of Southern-grown soybeans as seed for grain-producing crops. Such mistakes by seedsmen mean failures for their customers. Buy your soybean seed from men who are the best-informed in that line of seed. The varieties described in this book are the best with which we have become acquainted. If you wish to purchase some varieties, not listed here, write to us about the matter.

The Medium Green or Guelph Soybean



MEDIUM GREEN
Specimen Plants of Soybean Pods All Ripe

The Medium Green or Guelph Soybean is one of the oldest well-known soys in the U. S.

It is an old stand-by at the northern state experiment stations as a general purpose grain and forage growing crop. It is a good grain yielder. In 1911, Wooster Experiment Station raised 33 bushels per acre. We have had it grown in good soil, over 3½ feet high. It ripens medium early and if sown about June 20th in our latitude is about right to harvest for ensilage when corn is ready to cut for same purpose. Farther north where much earlier maturing corn, like Pride of the North corn, for example, is used for ensilage, Medium Green soys are mixed with the seed corn and they are planted, cultivated, harvested and put in the silo together.

We have received from some of our old customers wonderful reports of the effects on milk flow of feeding this mixed soybean and corn silage as compared with straight corn silage. We wish to recommend it as a good soybean to plant on very poor soil. In 1913 we raised 15 bushels to the acre of them on a large field, one of those poor, run down fields at which practically every man in the neighborhood has taken his turn at crop robbing. This in spite of a very backward summer and planting delayed until nearly July. It has medium to large size green seed.

We are giving in this book an illustration of our field of Medium Green Soybeans grown in the great drouth of 1914.

In 1915, we grew and harvested a very fine crop of seed, the best for yield and quality for several years. This in spite of a very unfavorable season.

Stone's Roosevelt Soybean

This variety of soys, we introduced to the seed trade of 1912 as a very satisfactory general-purpose soybean, good for hay, very excellent in every way as a grain producer. Every year since has added to its good reputation with men who have the pure seed. In 1911 we grew 30 bushels of very fine Roosevelt soys per acre, and it has done as well as we could ask, considering the seasons, every year since. Many of our customers have grown from 32 to 40 bushels of these soys per acre.

Stone's Roosevelt soy has the following good points: It is early-maturing, grows very erect and stiff-stemmed, regardless of its height, is one of the heaviest of grain yielders, and shatters out but little when it is harvested. The seed is small and consequently not so much is needed per acre for a full seeding as is needed with large seeded varieties. Very few seeds are cracked in threshing them and we believe that the plants themselves have more natural vitality than those of any other variety we have seen.



STONE'S ENSILAGE SOYS

This variety is very good for both grain, ensilage and hay production

As a good all-around soybean they have become so popular that unscrupulous seedsmen have foisted thousands of bushels of Mammoth Yellow, Medium Yellow, Ito San and other varieties of soys on the farmers of America as Stone's Roosevelt Soys in order to make the sale. One of the most prominent agricultural authorities in Ohio thought the Roosevelt soy was a fake, until he found out after a personal exchange of views that the variety which he had bought and tried out as the Roosevelt, was the old Mammoth Yellow Soy. No wonder that he had been so sure that the Roosevelt would not ripen seed in Ohio. A fair trial of the genuine Stone's Roosevelt seed, procured directly from us, convinced him of their value as a very prolific and early-maturing soy.

There is only one place where you can be sure of getting Stone's Roosevelt Soybean seed and that is from Stone's seed farm at Atwater, Ohio.

Stone's Ensilage Soybean

This variety of soys is a tall growing one, which we have tried out for several years on different farms to test its special value. We have been selling these soys to be used especially for growing in the same field with corn for ensilage where the Medium Green Soy would mature too early for the corn. Those who have grown them for this purpose have told us that these soys please them very well. This year we will now advise our customers in Northern Ohio who want to grow soys and corn together for ensilage, the same way it is done on thousands of farms farther north, to grow Stone's Ensilage Soys. The seed of this variety does not germinate so quickly as that of some others but the variety is full of vigor and vitality and will stand very adverse weather and yet make a crop.

Under favorable conditions this variety of soys grows very tall, plants five to six feet long being nothing uncommon. It is a better seed yielder than the Peking and is nearly as well adapted for hay production. The demand for them is very strong, so order seed early.

Mammoth Yellow Soybean

Mammoth Yellow Soys are about the latest maturing of all the many varieties of soybeans grown in America. They require a very long season in which to mature a seed crop, so that the seed must be grown in the South where it can have the climate necessary for full growth. These soys are very suitable, when one wishes to raise a great tonnage of green forage, 3 to 5 or more feet high, for use either as hay, ensilage, green manure or cover crop. But we have never known of its ripening seed in Ohio, except possibly in the extreme southern part of the State. Fine crops, yielding 20 to 35 bushels of large beautiful golden yellow seed per acre, are grown of this variety in the Southern States. On account of its being one of the great staple crops in parts of Virginia, North Carolina and Tennessee, because of its great benefits to the soil and the profits of growing it, the seed has become much cheaper than that of any other variety. This explains why this variety is handled by nearly all city seedsmen; the wholesale cost price is low and the seed can be sold cheaper than other varieties and yet the profits will be larger.

But this variety of soys while very well adapted to the South, is not adapted to conditions in the North except under favorable weather conditions. In a cold backward summer, we have seen the very smallest of Northern Ohio acclimated varieties of soys grow right away from the Mammoth Yellow Soys, which looked as if they were thoroughly discouraged with life in the North.

For average conditions on Northern farms it will be found that the Northern Ohio grown soybean seed is really the cheapest and in every way the most satisfactory seed to buy and plant



PEKING SOYS

Specimen plants showing tall fine stems and abundance of pods.

THE AGRICULTURAL LIME CAMPAIGN IN OHIO AN ABUNDANT SUPPLY OF LIME IN THE SOIL IS AN ABSOLUTE ESSENTIAL TO SUCCESSFUL AGRICULTURE

If the farms of the eastern half of Ohio as well as those in all or in large sections of other neighboring states are going to do their share towards supporting the coming population of the United States it is very self-evident to the best posted authorities in agricultural matters that these farms must be given large quantities of agricultural lime in the near future. The great majority of farmers have not yet begun to realize how absolutely necessary to successful agriculture, in the fullest sense of the word, is an abundance of fine carbonate of lime in the soil.

Nature gave to most of the soils of Ohio a fair supply of lime for the maintaining of fertility under natural forest and pasture conditions, but the natural supply furnished to the soils of the eastern part of Ohio was so much less than that given to the western part of the State that here in the eastern part is where we naturally expect the shortage and the shortage has come. Many have not yet been able to notice it but it shows up very plainly all over this part of the State to all observant farmers.

Where one Ohio farmer used agricultural lime ten years ago, ten to twenty farmers are using it liberally now! Where one ton of agricultural lime is used this year in Ohio, ten to twenty tons will be needed to supply the demands in five years from now!

No one subject, in lime-depleted sections, now occupies such a prominent place in the discussion of farm practices in soil improvements as does the subject of liming. Every agricultural authority of any prominence now advocates more or less strongly the use of agricultural lime on the large majority of farms in the north central and New England States. L

It was Dr. Chas. E. Thorne who advised us five years ago to give our fields an application of either one ton of ground lime or two tons of ground limestone per acre and he told us then and later of the remarkable increases in crops which they were getting at Wooster Experiment Station after they applied large amounts of Kelley Island ground lime or ground limestone per acre. Read his bulletin, No. 279. It tells of the wonderful results achieved from the investment.

We purchased our first carload of fine ground limestone from the Kelley Island Lime & Transport Company in the spring of 1910 and gave our corn ground a heavy application of this material. The first carload we used gave very paying results and so also has all the lime we have purchased from them since that time. In the fall of 1910 we first began to sell their agricultural lime in this section. Up to this time so far as we could ever find out, seventy-five to one hundred tons of agricultural lime was about the maximum amount ever purchased by farmers in this section in any one selling season. We perceived at once, however, that there was going to be an enormous demand for agricultural lime inside of a few years; if we could only get the farmers themselves to prove to their own satisfaction the need of it on their own farms. This took a great deal of missionary work on our part to get men to give the Kelley Island agricultural lime a fair trial. To many men we sold only very small quantities at first for experimental work. But the demand kept on growing. We handled the very best quality of agricultural lime in Ohio and were willing to sell it at a very close margin of profit and that "started the ball to rolling."

Only five years have passed since we made our first sale of Kelley Island lime here. Just see how the demand for lime has developed since that time. We would judge, roughly estimating the amount, that about 3,000 tons of agricultural lime and limestone were unloaded this past fall at the few little railroad stations near here, where less than 100 tons of agricultural lime was sold in one season a few years previously at the same points.

Each season has brought to us a large increase in business over the previous one and the increased number of orders we have forwarded to them have, in the "rush order" seasons, exceeded their capacity. But whether it was during a busy season or during a slack one, we have always received from them as fair treatment as we could reasonably expect. The sales manager and traffic manager of a great agricultural lime company certainly have a long list of problems and annoyances to worry and aggravate them during the fall months, because the great majority of farmers still make a practice of ordering all their lime for delivery during one month of the year; that is from about August 15th to September 15th.

Perhaps our customers can imagine, partially, at least, what a lot of trouble it causes the officers of the lime company to have nearly all the orders received by it specify about the same date for shipment of cars. In our business dealings with the sales managers of the Kelley Island Lime & Transport Co., we have found that they try to do what is right in handling their orders, but they cannot do justice to their customers, if all persist in ordering their lime at the same time.

The Kelley Island Lime & Transport Co. each year is making large additions to its agricultural lime manufacturing plants as well as increasing its storage capacity, in order to keep abreast of the rapidly increasing demand for its products. It

will be even better-prepared than ever before to give prompt and efficient service to its customers in 1916.

It has been our pleasure in past years to be associated with the officials in charge of the different departments of the Kelley Island Lime & Transport Co. and those associations have been very pleasant, for those men are friendly and courteous as well as keen and energetic. They are trying hard to do the very best work for the Company by being of the greatest service possible to the public. But they cannot do their best for us farmers, unless we try to do our part towards avoiding trouble by ordering our agricultural lime for shipment during the slack seasons of the year.

This company, in the selling of whose agricultural lime of late years we have taken a rather prominent part, has been going to perhaps more actual cash expense educating the farmers of Ohio to an intelligent and general use of agricultural lime than all of the other lime companies of Ohio put together. It is certainly a case of the Kelley Island Company against "the field," when it comes to a question of doing the work and paying the bills. In the fall of 1915, this lime company sent out two complete exhibition outfits to different County Fairs in North-Eastern Ohio, representatives of the company being in charge of the exhibits at all times, and being ready and pleased to explain the reasons for using agricultural lime, the methods of application of same, and the comparative values of different brands of agricultural lime and limestone. Thousands of farmers have looked at these exhibits and become acquainted at the same time with the work of this lime company and with the men who sell its products.



MR. STONE'S FAIR TENT

In the winter of 1915-1916, two complete moving-picture show outfits from the Kelley Island Lime & Transport Company will be in attendance at prominent farmers' institutes all over Ohio. These outfits will show very realistically with their own films the complete process of manufacture of Kelley Island lime from the drilling of holes in the limestone rock for blasting to the loading of the product in the cars. These shows are very entertaining as well as instructive and the Kelley Island Company has met all the expense of same itself. Why not arrange with the lime company to have them give this free show at your own farmers institute or Pomona Grange meeting? It is certainly worth enough to pay you well for going miles to see it. The Kelley Island Company has voluntarily gone to thousands of dollars worth of expense in this and other up-to-date progressive ways educating the farmers of Ohio on the subject of agricultural lime and they, the farmers, ought to take full advantage of the opportunities offered them to get much better posted on this subject which bears so close a relation to their present and future prosperity.

Will you begin in 1916 to give your field a liberal application of good agricultural lime, so that they may have a fairer chance to do their best for you or will you be willing to farm one more year at a loss?

REASONS FOR LIMING

Lime Improves Mechanical Condition of Soils

If you have a very tough tenacious clay soil and you apply plenty of good agricultural lime to it you will help very much the physical condition of the soil. It will tend to make it friable and much more easily worked and cared for and give it more of the character of a sandy soil. On the contrary if one applies lime to a sandy soil it helps to correct the short comings of such a soil. The lime seems to bind the particles of soil together and tends to give it more of the good qualities of a clay loam soil. It will hold moisture much better and we believe it will not allow the valuable plant foods to be leached out so easily during wet weather. If you have an old garden spot or a truck patch on a clay loam soil you will likely acknowledge that after farming it for a number of years your soil has become hard to keep in nice condition even after yearly applications of manure. Now try a very heavy application of Kelley Island Lime on your truck patch and garden and note the pleasant results you will get from its use inside of a year or two. We have seen some remarkable changes made in some farmer's gardens by the use of only fifty cents worth of lime. Try it yourself next spring.

Lime is a Plant Food

In the case of some plants we find that lime or properly speaking carbonate of lime is a plant food. Take alfalfa for instance. Alfalfa is a great feeder on carbonate of lime. Look up the chemical composition of the alfalfa plant and you will perhaps be surprised to find out what a large proportion of it is carbonate of lime.

For years there has been a warm discussion going on between the users of lime and the agricultural scientists over the subject, "Is Lime a Fertilizer?" Several firms who manufactured hydrated lime for agricultural use, put it up in paper bags and marked them Lime Fertilizer. Now farmers as a class have never objected so much to the name given by the manufacturers as they have to the exorbitant price asked for the lime by the salesmen.

Lime is a plant food, for just as surely as phosphorus, potassium, and nitrogen are necessary in the structure of plants so also are carbonates of calcium and magnesium. Carbonates of calcium and magnesium is the chemist's name for natural limestone or carbonate of lime. It is true of course that the majority of plants do not use but a very small proportion of lime in their growth, but they use it nevertheless, and some of them, especially legumes, use far more than others. At the Wooster, O., Agricultural Experiment Station they found that a heavy application of either ground burnt lime or ground limestone corrected the soil acidity so that medium red clover grew very luxuriantly where it was almost a failure before liming. Nevertheless they were not able to get alfalfa to do well there at all until finally they doubled the application of lime to the land intended for alfalfa. After that the alfalfa grew very well. Do practical farmers really care very much whether the alfalfa did well because the soil was sweeter or did well because alfalfa is a very large feeder on carbonate of lime and found a supply plentiful enough to suit it? As the man who was cured of blindness said to the Pharisees, "THIS I KNOW. WHEREAS I WAS BLIND, NOW I SEE."

Agricultural Lime Largely Increases Farm Crops

Years ago when we began to use Kelley Island Lime in heavy applications to the soil on our farm, we wrote to Dr. Chas. E. Thorne, Director of Ohio Agricultural Experiment Station, and told him of our plans. He answered our letter personally and in his answer to us stated that where they compared yields of crops at the Station on plots of ground, which were limed for corn, with plots not limed for corn, they found that the application of lime produced an increase of about ten bushels of shelled corn per acre, about the same number of bushels of oats per acre, the following year, and two to three more bushels of wheat per acre extra, the year following the oats, than they secured on the unlimed plots, not to speak at all of the increased clover crop, the most important of all. We have had a number of arguments with fertilizer agents on this subject and they have tried to make out that Dr. Thorne meant that these increases in crops came after the big clover crops began to improve the limed strips. But that is not the idea which Dr. Thorne had in mind when he wrote to us. Last winter we heard that the experiment station tests on lime now show a gain of about eleven bushels shelled corn per acre. Now we don't care whether the college scientists call lime fertilizer, plant food, filler, ballast or anything else, so long as we can get such an increase from its use. If you estimate the value of the increased crops from the use of lime on the Wooster Experiment Station farm at the present farm prices, you will see that the increase would pay for an enormous application of fine ground limestone per acre.

The average results attained at the Wooster, O. Experiment Station show a gain of from \$20 to \$30 worth of farm crops per acre from the use of a ton of good burnt lime per acre. Why not make sure of that profit from your own crops? We can sell you the very finest quality of agricultural lime at a very moderate price. Write to us for prices today. If we do not have a local Kelley Island agricultural lime agent near to you, perhaps we can induce you to act as our agent.

Lime Makes Plant Food Available

Good agricultural lime will exert a chemical influence on various forms of insoluble potassium compounds in the soil, so changing them as to make them available as plant food. This is a very important fact, for the great European war has largely prohibited the exportation of potash from the German mines to this country. Our nation has been using enormous quantities of these German-mined potash salts for a great many years. Now we will have to improve our agricultural practice so as not to be so dependent on the only great potash mines in the world. Potash is now extremely expensive in the fertilizer sack, while agricultural lime is cheap. Let us

therefore use plenty of lime on our soils and make a lot of the potash in them available as plant food.

Prof. Frear of Pennsylvania Experiment Station found that a heavy application of lime to nine different types of soils increased the supply of readily-available potash plant food at from 6% in muck soils to 55% in red shale soils, and the average of the nine soils showed an increase of about 23% or enough to add 60 pounds of available potash per acre. This is more potash than is found in a ton of ordinary complete (so-called) fertilizer. In a like experiment Prof. Frear also found that lime had also made phosphorus available as well. The average increase on eight different types of soil was over 43%, equal to 140 pounds of phosphorus per acre, as much phosphoric acid plant food as one would find in nearly a ton of high-grade acid phosphate. The above results in liberating plant food from the natural enormous stores of unavailable chemical combinations in the soil, was achieved by the heavy application of lime. Do not be afraid of robbing the soil of all its chemicals because the average soil contains enough potash to last for 3,000 years of cropping if it were possible to make it all available.

Lime cannot do its best for the soil except when it is in combination with a plentiful supply of humus. Humus cannot give anywhere near its best results except in combination with a large supply of lime.



A \$1,000,000 MAIDEN AND A \$1,000 COW.

L. O. Wheeler & Son, of Garrettsville, O., are good examples of our progressive Kelley Island Agricultural Lime Agents. They keep high-producing pure-bred Holstein cows and grow alfalfa and other protein feeds on their farm for them. The grand young Holstein cow, shown above Pleiades 2nd Rose No. 121,817 A. R. O., has a record of Milk 530.8 pounds; Butter 19.775 pounds in one week.

Lime Corrects Soil Acidity of Different Kinds

The whole system of successful agriculture in America rests on the basis of large supplies of lime and humus in the soil.

It would undoubtedly surprise a large share of American farmers if one told them that all the vegetable matter which they incorporate in their fields tends to produce an acid condition of the soil, yet such is the case. It is true also that, when one uses heavy applications of some commercial fertilizers such as so-called acid phosphate, for instance, he adds a small, very small amount of free sulphuric acid per acre, which may not have been entirely used up in the mixing, or combining of fine ground phosphate rock and commercial sulphuric acid. Acid phosphate, however, is not, strictly speaking, what chemists call an acid, but is a salt; that is a combi-

nation of an acid and a basic element. One ton of commercial sulphuric acid is mixed with one ton of ground phosphate rock and they work chemically on each other for quite a long time. The substance then formed is no longer sulphuric acid and phosphate rock, but a combination of two salts. The sulphuric acid breaks down the phosphate rock, eating into it and forming sulphate of lime and another form of phosphorus salt which is readily available as a plant food. Now if there is a little sulphuric acid left free or unused in the combination the acid phosphate will be a little acid. A very small application of lime will correct any acidity from this cause. Brother farmers, don't fly off on a tangent and claim that the use of acid phosphate has made your soil acid. It might have helped a little, but the principal source of acidity is the natural addition of vegetable acids, formed by plowing under vegetable matter.

The better farmer you are the more organic or vegetable and animal matter in the shape of manure, straw, litter, sods, cover crops, bones, refuse animal matter of all kinds, you will try to get incorporated in your soil, in order to increase, later on the supply of humus. To change this organic matter into humus we must have the aid of teeming millions of minute organisms or bacteria in the soil, who alone can accomplish this work. This work is called by chemists nitrification or the manufacturing of nitrates in the soil. These nitrates are later used as food by growing crops.

There is another form of soil bacteria which lives free in the soil and depends on the air in the soil for their nitrogen. Of course they are not such good workers as the nitrogen-fixing bacteria which live on legume roots, but if it were not for their presence in the soil, farms which do not grow any legumes, or receive any manures or organic matter to speak of would be in far worse shape than that in which they are at present.

These bacteria or soil organisms while at work throw off acid which if not counteracted or neutralized by some other substance would eventually destroy these same bacteria, which are so necessary to plant growth and also destroy the nitrogen-fixing bacteria which thrive on the roots of legumes and have the almost miraculous power of extracting nitrogen gas from the air and storing it as nitrates in the nodules on the roots.

See the many nodules, full of the richest plant food, on the root of the soybean on the back cover of catalogue. This is the greatest help which we can have to successful Agriculture. Do you use the help?

Lime is the chemical compound most suitable for off-setting, neutralizing, or destroying the acid secreted or formed by the soil bacteria. That is why we favor the Kelley Island fine ground lime. In actual practice it fits so very well the scientific theory. It is fine ground and dissolves quickly. By using common sense, one can readily see what a big mistake farmers would make if they depended on coarse hard limestone screenings of uncertain quality to do this work.

The trouble is to get agricultural lime fine enough and soft enough to dissolve quickly. We farmers do not want the work of neutralizing soil acids to begin in 1920 we want it done now.

The advantage of using ground caustic or ground hydrated lime in this work is that the particles of lime are more finely divided than in even the finest ground limestone. As fast as the acids are formed in the soil, they are neutralized by the lime in the soil. But nature did not treat all soils alike in furnishing them supplies of limestone. Some soils were only given a small supply which was soon used up in farming the land, while other soils were furnished an almost exhaustless supply of lime. The soils in Eastern Ohio received only moderate supplies compared with the soils of Western Ohio. The farmers of this end of Ohio have been using up their supply of limestone for from 50 to 100 years, without putting but little if any back on the land. Do you know that the better you farm, the faster you use up your lime supply? Don't be alarmed about that, because the game is worth far more in this case, at least, than the ammunition.

Down at Wooster Station, a good many years ago, they analyzed the soil in one big experimental field to find as nearly as possible how much limestone per acre the soil contained. Since that time they have been farming those fields in the most practical up-to-date way that they know how to do. They first applied to the land, years ago, one ton of burnt lime or two tons of fine ground limestone per acre. They also gave the fields in each 4 years rotation liberal application of fertilizer and moderate supplies of farm manure and one-half ton of burnt lime or one ton fine ground limestone per acre. From these specially-handled fields they are growing tremendous big crops and the yields are gradually increasing. This heavy cropping of the soil is giving profitable results above the cost of all lime and fertilizer applied to them. Although the bills for fertilizer and lime are large, the profits are very much larger.

Recent analysis of the soil of these Experiment Station fields have shown that the heavy cropping and consequent rapid formation of soil acids are using up over one ton of best quality of lime per acre, every four years!

Furthermore, a leading authority there said that if lime should be the limiting factor in crop production on these fields, the additional profits from its use would be so great, that if necessary they would apply double the above amount per acre every four years. This they are now doing.

Lime Stimulates the Development of Nitrogen-Fxing Bacteria

Our farm soils if they are kept well supplied with humus and carbonate of lime are full of soil bacteria of different kinds. These bacteria do the great work of preparing the food for different plants. They break up the different chemical compounds

in the soil and get them into such forms that our plant roots can utilize them. Lime and humus are the great agents for promoting soil bacterial growth so we should not only apply a plentiful supply of Kelley Island Lime, but also add lots of humus making material to our fields in the form of live-stock manures, and cover crops and other vegetable matter, all thoroughly worked into soil.

Under the head of Soil Bacteria Inoculation we have shown how absolutely necessary it is to successful farming, generally speaking, to raise legume crops on our soils, especially if they have been depleted by poor farming. It is an absolute fact that the most of legume bacteria will not do well at all on acid soils. It almost seems unbelievable that so few farmers, comparatively, in Eastern Ohio seem to recognize the fact and act accordingly.

The condition of your medium red clover crop is almost always a sure indication of your lime needs. The legume bacteria of medium red clover are present in our soils. If the soil is not acid and humus is in fair supply, the bacteria will multiply fast on the clover roots and your clover will thrive. If your soil has a fair supply of humus and the red clover does not do well, then get busy, buy a carload of our Kelley Island fine ground lime and get into the game.

Lime Makes the Farm Crops Richer in Protein

Dr. T. N. Lyon of Cornell Experiment Station at Ithaca, New York, conducted a series of experiments there of wonderful value to American farmers. These experiments showed the wonderful effects of lime on alfalfa, not only in increasing the yield of tons of hay per acre and increasing the percentage of pure alfalfa in this hay, but it even increased the percentage of protein in the alfalfa itself almost 30%. And analysis of one of the weeds growing in the alfalfa showed that its protein analysis had been increased over 21%.

Liming the land in this case had increased the first crop of alfalfa hay over 37%. It had increased the proportionate amount of pure alfalfa in the hay over 16%. And most important of all it had increased the available nitrate plant food in the soil over 90%!

Lime Destroys Many Plant Diseases

A heavy application of Kelley Island Agricultural Ground Lime or Limestone is almost a sure cure in every case of such root-diseases as "club foot" of cabbage and many diseases of turnips, beets and other root crops.

Lime on Pastures

So far practically all of the agricultural lime campaign work in Ohio has been devoted to getting farmers to use lime on the fields which grow the regular farm crops. At present over half the farm land in Eastern Ohio is in permanent pasture (so-called) which has really meant more or less permanent weeds and lack of good pasture. For the pasture land of Ohio has been even more thoroughly robbed of its lime supply than have the cultivated fields. Practically all intelligent farmers in Eastern Ohio know that, for some reason or reasons, their pastures are remarkably poor on the average and that it takes several acres of ordinary pasture to keep a cow.

A number of agricultural leaders in America have begun to systematically lime their pastures and surprise them as well with an application of phosphate and perhaps some barnyard manure. These men are getting very profitable results. The most of farmers in this section of Ohio are losing on one-half their farms, the permanent pasture land, what they are making from the other half, the cultivated fields. Better get busy with the neglected side of your farm in 1916 and while prices of all farm products are good, buy one or two carloads of Kelley Island agricultural lime and spread it over your pasture. You can draw a big interest from your investment for many, many years to come. Don't buy a cheap-John imitation of agricultural lime. Give each acre a heavy application of a No. 1 article. After you have done this work, then sow a good mixture of pasture grass seed over your permanent pasture.

Wonderful Results from the Use of Agricultural Lime

Some of our customers have tried various ways of testing it out on their fields. Whenever they left unlimed strips the difference in clover growth between the limed and unlimed strips was oftentimes, the difference between success and absolute failure. A few made the mistake of using a very light application of only a few hundred pounds per acre. While some of our customers use only one-half ton of lime per acre each rotation, the most of them are now using one ton per acre and the most far-sighted ones are using two tons per acre. In tests which we have made on our own farm, we found that (for the first application at least) we secured as much profit from using the second ton of ground lime per acre as we did from the first ton per acre.

If any farmer was in doubt as to the possibility of grain in crops that would follow the use of Kelley Island agricultural lime to our Ohio soils, he would soon have his doubts dispelled after he had seen what that lime has been doing for the crops in this part of the State, especially in Portage County in the last five or six years. We have seen this brand of lime tested on many farms in many different ways and have yet to see the first case, where a heavy application of it did not make a splendid showing. Some farmers tied it in strips across their fields in order to study the effects, while others limed either sides or corners of fields for comparison with unlimed parts.

The great majority of men who have once used good agricultural lime become very enthusiastic over the results obtained and apply it to their fields more or less regularly from that time on. Where the lime has been applied in strips across fields, its effects show so plainly on the clover crop, that the limed strips could easily be distinguished a ½ mile distant. One doubtful farmer applied a dollar's worth of Kelley Island Lime to a narrow strip of ground across a field prepared for wheat seed-

ing. The next year he reported that all of the clover which grew in the whole field was in that strip.

Of late years we have been seeding down our meadows with a mixture of medium red clover, 3 quarts, Alsike clover, 1 pint, Montana hardy alfalfa, 2 quarts and timothy, 2 quarts per acre. All of these plants seemed to do well together on well-limed soil and the resultant hay crops have been very satisfactory. In 1915, we cut a very nice first and second crop of this mixture, and a glance at the illustration in catalog will show how the third crop (all alfalfa) looked before harvesting. In the middle of this field, right where photo was taken, no kind of tame grass used to grow before we limed it but several kinds of swamp or wire grass, of no value whatever for hay or pasture. What a change!

It took a heavy application of Kelley Island Lime to make this change, but it certainly paid us to do it. We are now confident that there are thousands of acres of Eastern Ohio soil, heretofore considered unfit for alfalfa production that would grow splendid alfalfa if their own owners would give them a very heavy application of the very best Kelley Island Agricultural Lime.

Leading farmers all over the country are now taking up the business of liming their land, mainly to get the profits from raising big crops of legumes. Every year adds a big army of recruits to this enterprise. One can almost judge the zeal and enterprise of the farmers of any section of Eastern Ohio by their lime purchase. We now sell a carload of Kelley Island Lime more easily than we used to sell a ton. While it is perhaps true that Atwater, O., has become almost as well known for her soybeans as is Poston for her baked beans, we take more pride as citizens, in the record she is making in the use of lime.

We believe more agricultural lime is unloaded here than at any other R. R. station in Northeastern Ohio and are glad of the part we have taken in introducing it and encouraging such a large consumption.



ALFALFA ON LONE ELM FARM.

This shows the vigorous third crop of alfalfa in part of field which had received 5 tons of lime per acre. Previous to being limed, no tame grasses at all would grow in this part of field. Why not lime your fields and grow alfalfa?

When to Apply Lime

Apply any kind of Kelley Island Lime to any meadow or pasture fields at any time that you can take to do it. Any time is a good time, but the best time is now. The sooner that you get all of your farm heavily limed, the sooner will your farm income get a large increase. Apply caustic lime to fields prepared for planting at least one or two weeks before seeding if possible and harrow into soil very thoroughly. Ground hydrated lime can be applied to growing wheat in winter or spring with fine results in grass stands. Kelley Island Ground Limestone may be applied to any growing crop at any time that you can do the work without injuring the crop by trampling. We have known of its being spread over cornfields after corn plants were over 2 feet high, with very satisfactory results in the way of increased corn crops.

What Brand of Agricultural Lime Shall We Use?

Use Kelley Island Tiger Brand

Why Use This Brand?

In order that we may get for the least amount of money the very best combination of quality in the lime and of service from the lime company from which we purchase it. Quality, Service, Price. No other lime company in Ohio can equal the Kelley Island Lime & Transport Co. in these three most important conditions of sale for agricultural lime.

Kelley Island Tiger Brand Agricultural Lime is sold in three forms, each of the highest quality of its class. They are Ground Caustic or Burnt Lime, Ground Hydrated Lime and Ground Limestone.

FORMS OF AGRICULTURAL LIME

Kelley Island Ground Caustic Lime

Ground caustic lime is richer in lime of course than the hydrated lime which always takes up a certain percentage of water in the course of manufacture. Ground caustic lime, however, though it is richer is also objectionable to use. Kelley Island ground caustic lime is very rich in lime, which means it is very caustic in action. The Kelley Island Company puts it up in paper sacks weighing about 75 lbs. each or in jute bags, weighing 140 lbs. each.

Do not delay using it after receipt of car for it is sure to burst the sacks if kept in them very long, for it begins at once to gradually take up moisture from the air and then swells until it finally bursts the sacks. When you buy your agricultural lime use the same judgment that you use in buying your fertilizers. In other words judge the value of your lime by its mechanical condition and its chemical analysis. Let us illustrate this point.

Kelley Island Ground Caustic Lime analyzes in Ohio State Chemist's report for 1913 53.23% calcium oxide and 33.12 magnesium oxide. Since magnesium oxide is worth about one-sixth more than calcium oxide in correcting soil acidity, the total value of this lime would be about 91 or 92% calcium oxide. We know of another make of agricultural lime sold in Ohio whose value in calcium oxide as judged by Ohio State Chemist's test is about 52% only. If the 52% lime is worth retail \$6.25 per ton, then the Kelley Island caustic lime is worth at least \$10.90 per ton and the expense of hauling and spreading the poor lime would be the same as for the best. Yet the farmers who bought this low grade of lime paid as much for it as the farmers who bought the Kelley Island Lime in the same railroad yards.

No intelligent farmer would now let a fertilizer agent sell to him a 10% acid phosphate for the price of an 18% goods. Then why pay a lime agent the same price for a 52% lime as for a 91% lime. We farmers can not afford to work with the poorest of farm tools, neither can we afford to use the poorest of lime.

Buy Kelley Island Agricultural Lime; the Best.

Kelley Island Ground Hydrated Lime

There is about the same amount of actual lime in either 100 pounds of pure carbonate-of-lime ground limestone, 74 pounds of ground hydrated lime, or 56 pounds of ground caustic lime. But in the actual practice of manufacturing Kelley Island Hydrated Lime a much smaller proportion of water is used in the hydrating or "slaking" the burnt lime than would ordinarily be used in other lime works. So the Kelley Island Hydrated Lime is really much stronger in proportion to the Ground Caustic Lime than the above commonly-accepted figures would indicate. Besides no intelligent men should ever claim that the finest particles of ground limestone are as fine as those of the best grade of ground hydrated lime. Unquestionably one ton of ground hydrated lime will make more show in spreading a cover of lime over a field than will 2 or 3 tons of the finest ground limestone.

A large paper sackfull of Kelley Island pure white hydrated lime will weigh only 40 pounds, while a bushel of ground limestone will weigh about 120 pounds. The ground hydrated lime, being much more finely-divided should be able to give a much more even distribution of lime all through the soil and to correct more acidity in the soil than would be accomplished by the same amount of actual lime in the form of fine-ground limestone.

Most all comparisons of values of Kelley Island Hydrated Lime and Kelley Island ground limestone have been made on the basis of delivered price at the R. R. station of the farmer who purchased it. This is not fair at all, because it costs a farmer time and money to haul lime from one to ten miles and even after he gets it home he has the items of storage for the lime and cost of spreading it as well to consider. The only fair way to compare values is to compare the cost of both kinds of lime, availability considered, when evenly spread over the farmer's field, after all bills for lime and for hauling, storing and spreading it have been paid. The price of labor on Ohio farms as well as in Ohio factories is advancing all the time and when the time of a farmer and his hired help reaches a certain value per hour, then he cannot afford to put in much of his time handling anything else in the line of agricultural lime but the best grade of hydrated lime, which means the Kelley Island.

Kelley Island Hydrated Lime is of very high analysis, worth nearly 25% more than the hydrated lime of many competitors and nearly 50% more than some of them. It can be hauled home in the least busy season of the year and stored indefinitely and yet always be ready for immediate use. There is going to be by far the most tremendous demand for this brand of agricultural lime in 1916 that Ohio has even seen. Four reasons will account for this; First, many more farmers will begin to use it this year for the first time, since thousands of farmers have just become acquainted

with the Agricultural Department of the Kelley Island Company in the past few months and a large share of these men will use Kelley Island Lime; Second, the increasing value of the time of a busy progressive Ohio farmer and his help will cause him to use the most available and highest-analyzing form of agricultural lime; Third, crops will be worth more money and farmers will want to get the largest possible increase in crops in 1916, so they will use the quickest-acting and finest quality of lime in order to help secure the increase; Fourth, the prices of commercial fertilizer have already advanced from 25% to 50%. A heavy application per acre of Kelley Island Hydrated Lime to a sour soil will undoubtedly release sufficient plant food, heretofore laying there either unused or else leaching away, with which to give an increase in the corn crop of much more value alone (not to speak of gains in the crops which follow it) than the cost of the lime. The east end of Section D on Wooster, O., Experiment Farm has never been limed and the corn crops on the west end of the section (the limed end) have been regularly 12 to 15 bushels more shelled corn per acre than those on the unlimed end. That much shelled corn is certainly worth more than the cost of a ton of Kelley Island Agricultural Lime.

Kelley Island Fine Ground Limestone

This is a very popular form of lime in sections of Ohio where farms are located close to R. R. stations, where the condition of highways permit the hauling of large loads, and where farm labor is comparatively cheap. Do not use ground limestone unless you use it liberally. Use at least one ton per acre, better 3 or 4 tons per acre. It is sold either in bulk, in paper sacks or in jute bags and is always shipped in tight box cars. Being very dry it can be handled just as cheaply in the winter season as at other times.

Never get it confused in your mind with limestone screenings which is a more or less coarse by-product of limestone-crushing plants. This stuff which is of very uncertain screen and chemical analysis is always shipped in open cars and generally reaches the R. R. point of the purchaser, either soaked up with water, if shipped during ordinary rainy weather of growing season or else frozen up if shipped during winter. Perhaps if a farmer's time is worth nothing he can afford to haul and spread screenings if he applies at least 6 to 8 tons per acre. Otherwise it is doubtful; if he can really afford to use it.

Good limestone is composed almost altogether of carbonate of calcium and carbonate of magnesium. Carbonate of calcium is often called carbonate of lime but a little study of the analyses of all the different kinds of agricultural limestone sold in Ohio will show that they all contain more or less carbonate of magnesium. The latter compound is worth more for correcting soil acidity than is carbonate of calcium. To be exact: 34 pounds of carbonate of magnesium has about the same value as 100 pounds of carbonate of calcium. The official state analysis of Kelley Island Ground Limestone by the Ohio State chemist for 1913, showed that it contained 77.24% carbonate of calcium and 18.77% carbonate of magnesium. The 18.77% carbonate of magnesium would be equal to about 22.34% carbonate of calcium. This added to the 77.24% would give the value of a limestone analyzing 99.58% carbonate of lime.

Several makes of ground limestone sold by Ohio firms have a total value of about 85% or 86% carbonate of lime only. The Ohio chemists' report will show this to be true. It is therefore, very evident that if these low-analyzing grades of ground limestone cost \$3.00 per ton delivered on the farm, then Kelley Island Ground Limestone will be worth over 1-6 more than that or about \$3.60 per ton. Does any farmer want to apply low grade lime to his farm when he can buy the best grade for but very little more money?

When to Order Kelley Island Agricultural Lime

In order that the lime company many be well-prepared to fill orders for carloads of agricultural lime on the exact dates specified in orders, customers are requested to send in their orders to their local Kelley Island agricultural lime agent or direct to us, just as far in advance of date of shipment as possible. The lime companies must order the empty cars, needed for loading agricultural lime, quite a long time in advance of shipping dates in order to be sure of getting them on time. In times of car shortage it is very difficult to secure extra supplies of empty cars from the R. R. companies. In fact, it is practically impossible to do so on short notice.

Now since practically every farmer who reads this notice will need Kelley Island Agricultural Lime either now or at a later date this year, why not treat yourself and every one else concerned fairly by Ordering Lime Now for shipment at some specified date. It will not cost you any more by ordering now and possibly less and you will not, of course, have to pay for it until after you get it. If you believe in the liberal use of the good quality of agricultural lime and think that you possess the qualifications of a good agricultural lime agent, write to us concerning the matter of territory for agency work.



ALFALFA PLANT LESS THAN ONE YEAR OLD

This shows the wonderful bacterial growth of nodules on the roots, the result of using Mulford's Nitro-Germ for alfalfa. Such a large amount of nodules are developed on the enormous root growth of alfalfa that at least 40% of the fertilizer value of the whole plant is in the soil in the root system, after the crop is harvested. Is it any wonder that alfalfa, well inoculated, is such a wonderful soil builder?

BACTERIAL INOCULATION OF LEGUMES

A plant on whose roots a certain kind of bacteria will thrive, which kind of bacteria has the function of drawing nitrogen from the air and storing it up on its roots in the form of nitrates is commonly called a legume. There are about thirty well known legumes, besides perhaps hundreds of other kinds of legumes not so well known. The best known legumes are alfalfa, sweet clover, medium red clover, mammoth red clover, alsike clover, crimson clover, white clover, soybeans, cowpeas, Canada field peas, winter vetch, spring vetch, etc.

The legumes bear their seeds in pods.

Now with the exception of sweet clover and alfalfa which allow the same bacteria to inoculate their roots, each kind of legume takes its own kind of bacteria to inoculate its roots and no other kind will do it.

Always bear that in mind. You can't inoculate your soybean roots with cowpea bacteria nor your winter vetch roots with red clover bacteria. The bacteria are different just as the plants themselves show a difference.



WHAT A CONTRAST?

Alfalfa plants, one uninoculated and the other inoculated with Mulford Liquid Culture. Photo shows the exact proportionate size of two plants.

Nitrogen is the most expensive element of fertility that we have to purchase in the fertilizer sack, so it behooves us to study up the legumes and the subject of inoculation so as to cut the nitrogen bill from our fertilizer bill and at the same time build up our farms. When you inoculate your legume crop you not only increase the value of your crop but help your soil even more so. At the present prices of nitrogen in the form of nitrate of soda a three-ton crop of inoculated sweet clover hay would represent a gain of over \$19.00 drawn from the air without charges. A three-ton crop of inoculated soybean hay would represent a gain of over \$17.00, conservatively speaking; a like weight of inoculated medium red clover hay, \$14.00 net gain, a three-ton crop of inoculated mammoth clover hay, \$12.00, and a three-ton crop of inoculated cowpea hay, about \$10.00 gain. Winter vetch hay inoculated would rank as high comparatively as sweet clover hay ton for ton as a nitrogen gatherer. It certainly seems to us that no man of intelligence who once thoroughly understands these principles will fail to take advantage of them and get just all the gain he can get from the use of legumes in the rotation.

If our customers have the fields ready for the legumes, we can furnish them the agricultural lime with which to make them sweet and the first class seed of different legumes for planting. Now the last and one of the important points is to get the legume roots inoculated. If you simply wish to grow clover in this part of the United States, you will hardly ever have to inoculate for the common clovers, because most of our soils have already been inoculated, by nature for many years. In many sections where sweet clover has grown for years the soils in the neighborhood are not only inoculated for that crop, but for alfalfa as well. But the northern part of the United States is not the native home for soybeans, cowpeas, and many other legumes, so if we wish them to do their best for us we MUST inoculate them.

We have so many questions asked us in our seed correspondence about the life, habits, and other matters connected with the bacteria which sometimes make their home on the roots of legume plants that we will use some space here to explain some things in connection with the subject. Very few soils contain the bacteria necessary for the inoculation of many legumes, that wonderful family of plants which are nature's great assistants in building up impoverished soils or improving good ones. Generally speaking most of our cultivated land in this part of the United States is inoculated with the bacteria which thrive on the different common clover plants, but that is about all with the possible exception of garden peas and beans.

A legume crop is, generally speaking, one which contains an unusually large proportion of nitrogen in its composition compared with most of the other common crops. If the soil in which the seed is sown contains a very abundant supply of nitrogen available for plant food, the legume will be apt to thrive even if it should not be inoculated, but the growth of the crop will all be at the expense of the soil. If the soil is very deficient in nitrogen a legume crop will either be small or weakly or both. Take the soybean crop for instance. It has been proven that not only will an inoculated soybean crop be larger than an uninoculated one, other conditions being the same, but the inoculated plants will also analyze considerably higher in protein than the uninoculated ones.

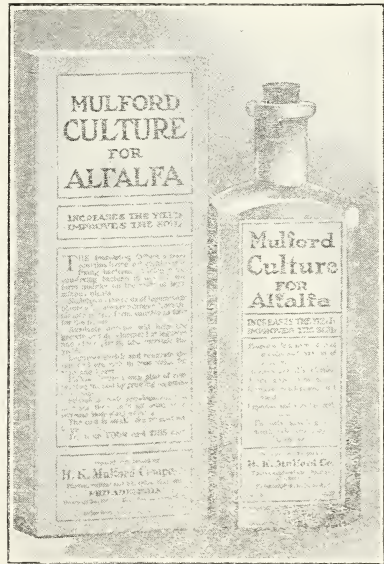
H. K. Mulford Culture for Legumes

In order that our customers may have the most up-to-date and complete equipment for the production of legumes, we have made arrangements with the world-wide-known H. K. Mulford Company of Philadelphia, the leaders in the production of all kinds of bacteriological preparations of the highest class, such as small pox vaccines, typhoid and diphtheria serums, and other like preparations used by all the best physicians in America to furnish us for the use of our customers liquid culture preparations of each different kind of nitrogen-fixing bacteria put up in one-acre and five-acre sized bottles ready for immediate use after receipt, for inoculating any legume crop which our customers may wish to plant. If customer will send us the name of the legume crop which he wishes to inoculate we will sell to him a 1-acre sized bottle of the proper liquid bacteria culture for this legume for \$1.50 and a 5-acre sized bottle for \$5.00, thus reducing the cost of the essential culture to only \$1.00 per acre. By this method we may furnish our customers anywhere in America the very best and purest culture of any of the nitrogen-fixing legume bacteria at a very normal cost.

This liquid culture is put up in flint glass bottles with rubber stoppers and each bottle is put in special boxes which contain special explicit directions for the use of the culture. The directions are so simple and so easily understood that any bright boy or girl should easily be able to follow the directions for treating the seed. When our customers know that the liquid culture bacteria or Nitro-Germ which we sell to them is prepared and tested by the H. K. Mulford Company with the same degree of care they use in preparing diphtheria antitoxin and small pox vaccine and other wonderful helps to the human kind, it will give them the greatest of confidence in the result of their investment. Their legume cultures have been found to contain at the rate of at least 13,000,000,000 per acre-sized bottle.

The Mulford Culture for alfalfa, crimson clover, sweet clover, white clover, red clover, alsike clover, cowpeas, soybeans, Canada field peas, peanuts, spring vetch, winter vetch, sweet peas, garden peas, garden beans is always kept in stock for immediate shipment. Mulford Culture for mammoth clover, burr clover, yellow clover, perisperm clover, hoise beans, velvet beans, perennial peas, lupins, sainfoin, beggar weed and many others will be prepared after receipt of order and shipped a few days later. If customer wishes the inoculation shipped to him by express or parcel post he will have to pay the charges, but by sending us their orders for Nitro-Germ and legume seeds at the same time we can arrange to ship the Nitro-Germ with the seed and save our customers the parcel post or express charges.

This year we have for sale soil which is inoculated remarkably well not only with the soybean nitrogen-fixing bacteria but with the cowpea bacteria as well. Notice the good illustrations in this catalogue of inoculated soybean and cowpea roots, showing the remarkable development of tubercles or nodules. Both the cowpea and soybean roots in photos came from the above field. This field has had in the past years very liberal applications of the rich Kelley Island agricultural lime to encourage a great bacterial growth and the illustrations show very well that we have them. Since the soil we will sell this year is inoculated with both soybean and cowpea bacteria it is really worth twice as much to the customer; but we will sell it to him at the same price we have been asking in previous years for the soil inoculated for soybeans alone.



The way in which the H. K. Mulford's liquid culture of the bacteria belonging to different legumes is put up for our customers.

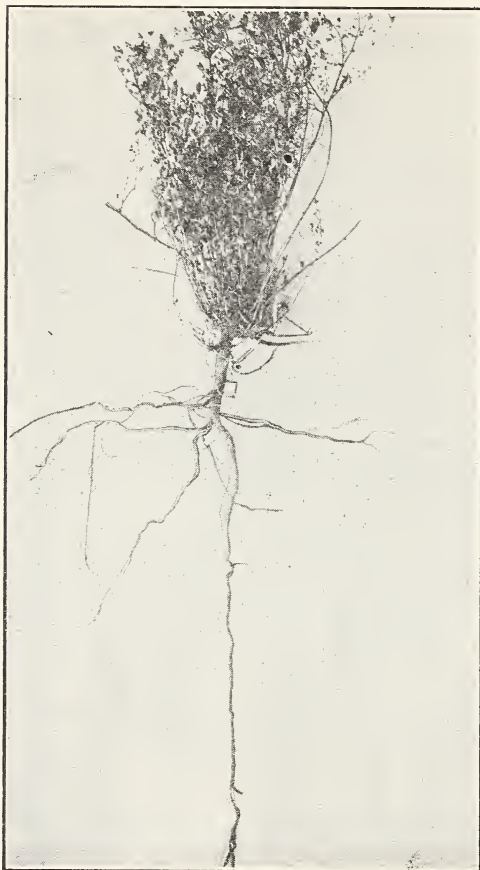
Guarantee on Inoculated Soil.—If any of our customers for soybean-cowpea bacteria-inoculated soil will furnish us next winter with satisfactory evidence that they did not get inoculation started on their soybean or cowpea roots after using our soil according to directions, we will duplicate their orders for soil again in the spring of 1917, free of charge, F. O. B. cars, Atwater, O.

Why buy expensive commercial nitrogen for fertilizer when you can grow large legume crops easily by using Kelley Island Agricultural Lime and Mulford's Liquid Cultures for legumes? These legumes will draw the nitrogen from the air and greatly enrich the soil for all other crops by nature's own method.

ALFALFA

HARDY THREE-YEAR OLD ALFALFA PLANT

Notice the branch roots. The main tap root penetrated over four feet of hard clay subsoil. Alfalfa draws large supplies of phosphorus and potash from the subsoil. It must have lime and inoculation in order to thrive.



Perhaps no other crop has ever been "boomed" in America as alfalfa has been. There have been so many good things said about alfalfa in the past that it is not necessary to say much about it to well read people. However, our catalogue travels all over the world among many nations and to some of them alfalfa is not a familiar crop.

For those who can grow alfalfa successfully, perhaps it is the greatest of all crops grown for stock feeding, but many farmers who grow it under conditions unfavorable to the plant, do not raise what we would call successful crops of alfalfa considering what would be the value of the other crops which would be fitted for those soils. Alfalfa does its best work in a good rich soil, which possesses first class natural underdrainage. Alfalfa will do well in clay loam soils which are thoroughly tile-drained, but the alfalfa will be always the best over or close to the tile drains. It is absolutely necessary that soil for alfalfa growing have a very liberal supply of fine ground limestone in its composition. Generally speaking, the average field in eastern Ohio should receive an application of at least three or four tons of fine ground limestone per acre.

A good application of phosphated stable manure should be plowed under in the spring and ground thoroughly prepared for seeding. Seeding may then be made with early oats or barley as a nurse crop, but we think the best stands are secured by deferring the seeding until some time in July right after a rain mellow and dampens the soil. Keep the field harrowed from plowing until planting

time, in order to hold the moisture, prepare a fine firm seed bed and germinate and kill out the weed and grass growth, whose presence would almost mean death to a successful alfalfa crop.

It is sometimes well to clip the first season's growth in the fall and allow it to lay as a mulch on the alfalfa. The following year one should watch the alfalfa and cut it for hay, each time as soon as little shoots begin to start up from the crowns to indicate that the new growth was starting.

Do not allow it to dry out before cocking it up to cure, because it is very apt to lose its fine leaves, if allowed to cure in the swath and will lose much if cured in the windrow. For peace of mind we advise all alfalfa and clover hay producers in sections where rains are prevalent in harvest season to supply themselves with muslin 40 by 40 inch hay caps. Then let it rain, if it is so inclined; one's religion is not apt to be tried so much.

It is a very good paying plan to give alfalfa fields a yearly broadcast application of about 500 pounds of either acid phosphate or basic slag and a ton of fine ground limestone per acre and a good top dressing of manure. With good treatment like this, alfalfa will produce three or four good crops per year for from four to fifteen years. The best, purest, alfalfa seed is the cheapest in the long run. Use from 15 to 25 pounds of seed per acre lightly harrowed in at planting time.

Prof. P. G. Holden, one of the best posted alfalfa experts in the world, says that a splendid lot to choose for an alfalfa seeding is one from which a good clean crop of inoculated soybeans had been harvested the year before. One season's good

cultivation for a corn crop, followed by another year's clean cultivation for a great nitrogen storing soybean crop, leaves a solid seed bed for alfalfa which should not be plowed at all but only needs to be cut up well on top with a disc harrow and other harrows at different times from spring up until time to sow the alfalfa seed in July. This means practically three successive years of clean cultivation before sowing the seed. If the corn ground has already received a good application of lime, we would recommend sowing at least two tons of Kelley Island fine ground limestone per acre on this soybean stubble in the spring before or after the first harrowing.

We strongly recommend to our customers that they sow from two to four pounds of alfalfa seed per acre, mixed with their clover seed at each regular seeding and keep it up each year. Eventually our customers will then not only find out on which parts of their cultivated land alfalfa will thrive, but they will also gradually and thoroughly inoculate all of the soil for successful alfalfa seeding in the future at very small expense. At the same time they will increase the feeding value of their hay crop and furnish a very much better sod to plow under afterwards for corn.

Do not delay the cutting of alfalfa when the small shoots first appear even in rainy weather, or the alfalfa plants will be much injured and turn yellow after the crop is cut. After each crop of alfalfa hay is harvested, we advise our customers to cross harrow their fields each way with a good alfalfa spring-tooth harrow. This will tear out most of the young grass and weed plants and do the alfalfa no harm. It is very necessary to keep down the weed and grass growth in successful alfalfa growing.

Inoculation

A very large share of the failures in growing alfalfa are due to lack of good inoculation. Inoculation is absolutely necessary for successive alfalfa culture. We are prepared to furnish our customers with the most reliable liquid culture inoculating material to be found in America. It is prepared for us by the H. K. Mulford Company who are known the world over as the leaders in the production of the very finest quality of all bacteriological products as well as liquid cultures for the different legumes. The soybean, cowpea, or clover inoculation in our soil will not inoculate the roots of your alfalfa plants at all, because each legume requires its own inoculation.

Alfalfa Seed

The very best alfalfa seed that can be purchased will be apt to be the cheapest in the long run. We advise our customers to purchase alfalfa seed that has been grown as far north as possible, preferably in Montana or Idaho, where alfalfa naturally becomes much harder, owing to exposure to very severe conditions of extreme cold during the winter and of great drouth in the summer. The hardy northern grown alfalfa seed will produce plants which have many more side or brace roots than ordinary alfalfa plants possess. These side roots help them very much to withstand the tendency to "heave out" during the period of late winter and early spring frosts.

Pedigreed Grimm Alfalfa Seed

Grimm alfalfa is a cross between a hardy yellow-flowered trailing alfalfa and the common purple-flowered. It does not depend so much on a main tap root, as does the common alfalfa but puts out a large number of branch roots, giving it much of the ability of common clover to withstand adverse conditions. Even the crowns are naturally much closer to the ground, a large proportion of them being below the ground level. These characteristics have given it the ability to withstand the hardest winters that can be endured by any kind of alfalfa.

Our pedigreed Grimm alfalfa seed is produced by one of the best-known and most reliable Grimm alfalfa seed growers in America on his ranch in Northern Montana. This seed we sell is for seed production and we recommend from one to two lbs. seed per acre in 28 inch rows. Cultivate the plants and harvest the seed with the same care that you would give to other valuable seed.

SWEET CLOVER

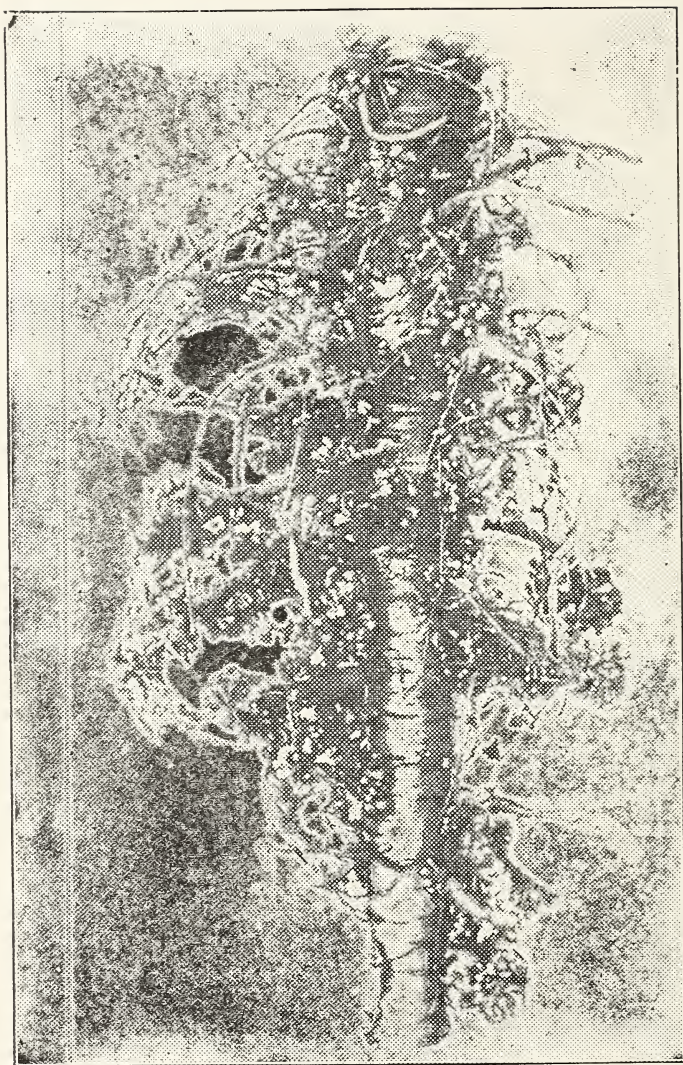
This is a plant which has been in past times regarded as a noxious weed by the most of farmers, but of late years the pioneers and leaders in a newer and more enlightened and progressive agriculture have been giving to sweet clover a great deal of the credit belonging to it. Sweet clover has so many good points in its favor that it seems strange that it has received as little friendly treatment from farmers in the past, but times are changing very fast and farmers are purchasing much sweet clover seed, using the crop for many purposes.

We cannot do better for our readers than quote direct from Prof. P. G. Holden in his book on Sweet Clover, published by the Agricultural Extension Department of the International Harvester Company of New Jersey to whom we return our thanks not only for the privilege of quoting this but for the use of the wonderful half-tone of the sweet clover root.

"Few people realize just how extensively it is grown in the United States. I realize that the impression of many who read this bulletin will be first, that of surprise; and second, that of condemnation, believing it will be the means of distributing a noxious weed throughout the country. I shall not be surprised if many people at first have this opinion—I have had it myself, and if I had not made a study of the plant, I should still consider sweet clover a roadside weed of little or no value. I wish to say, however, that sweet clover will ultimately be grown in many sections and upon many farms.

A Few Points We should Observe

Before attempting to grow it, we should have a thorough understanding of its requirements and habits, so that at least an estimate of its value under given conditions may be made.



INOCULATED SWEET CLOVER ROOT.

A wonderful exhibition of nodules on sweet clover root. This will give the reader some idea of the wonderful ability of this plant as a nitrogen gatherer, when well-inoculated. The same nitrogen-fixing bacteria work on sweet clover roots that work on the alfalfa roots. Don't fail to inoculate your sweet clover seed before sowing with our Mulford Liquid Culture and sow your seed on soil limed with of using Mulford's Liquid Culture for alfalfa. Such a large amount of nodules are

I believe it will be beneficial to those who are making a study of sweet clover to note the following points:

- 1st. It is an excellent crop to prepare the land for alfalfa in heavy, hard and poor soils.
- 2nd. Its roots being softer, sweet clover becomes inoculated more readily than alfalfa.
- 3rd. Sweet clover does not stool as much as alfalfa. The shoots start from the main stem and on this account the mowing machine should be set as high as possible, so as to leave plenty of small shoots to start the next crop.
- 4th. Sweet clover will not bloat cattle or sheep. This is one of its chief advantages over the other clovers. It is a great milk producer.
- 5th. Ground intended for alfalfa will be greatly benefited by previously seeding one and preferably two years to sweet clover as it inoculates the soil for alfalfa.
- 6th. It is a valuable crop in rotation because its roots decay very rapidly, adding much humus to the soil and furnishing much plant food.
- 7th. It is customary to turn stock on the sweet clover in the early spring when it is young. There being no other green feed they will soon become accustomed to it and like it.
- 8th. Sweet clover is a great soil enriching crop. A great many of the experiments conducted to ascertain its beneficial effects prove that it is one of the greatest crops we have for the soil.
- 9th. Sweet clover is rich in feeding value. It contains more protein than red clover and equally as much as alfalfa.
- 10th. Sweet clover will grow on land too wet or on land too dry for alfalfa or red clover.
- 11th. Sweet clover grows more rapidly than alfalfa when young, produces a good crop the first year, and provides early green pasture.
- 12th. It will stand more alkali or more acid in the soil than alfalfa or red clover and produce a crop.
- 13th. It thrives where rainfall is heaviest and where rainfall is too light to produce many other crops.
- 14th. It needs a firm, solid seed bed. The ground should not be loose. Many of its failures on cultivated land have been due to a loose, mellow seed bed.
- 15th. It seeds freely in humid as well as in dry sections.
- 16th. It will grow in many of the Southern States where red clover fails.
- 17th. Sweet clover makes an excellent green manure.
- 18th. Sweet clover grows best on soil containing plenty of lime.
- 19th. Perhaps one of the greatest advantages of sweet clover is its ability to thrive on almost any type of soil and under almost any climatic conditions.
- 20th. Sweet clover should not be allowed to stand too long, as it becomes woody and loses its leaves. It should be cut when 18 to 20 inches high and before it blossoms, if it is to be used for hay.
- 21st. It is a weed in waste places only. It never damages cultivated crops.

COWPEAS

About 15 years ago this legume was but little known outside of three or four Southern States. Now its fame like the soybean's has traveled all over America. Cowpeas are good feed for any kind of live stock and some varieties are very highly esteemed as food for best American citizens. There are a great many known varieties, at least 100 kinds, but some varieties are so much more superior to the average run, that we aim to handle only a few of the best. We advise the growth of cowpeas more for southern Ohio, Indiana, Pennsylvania, etc., and on farther south. In northern latitudes soybeans are much more satisfactory and make better crops.

If it is desired to grow a catch crop for soil improvement in between other crops, the cowpea comes in there as a winner. In many places it will be a much more satisfactory crop than the soybean if the seed is broadcasted, because cowpeas cover and shade the ground more quickly than soybeans and hold back the weed growth. They will stand drouth very well when most other crops fail and are wonderful soil improvers, especially in a warm climate as they seem to require a warmer climate than the soybean. Most of all cowpea seed sold is raised in the south. It is not nearly so easily harvested for seed nor so easily threshed as the soybean. That with smaller seed yields per acre keeps the price up. But for green soiling crop, for hay and for soil improvement, they occupy now a very prominent position among the leading legume crops. They are either planted in rows and cultivated or else sown broadcast, using just about the same amount of seed per acre as one would use of Mammoth Yellow soybeans, seeds of which are about the same size. If grown for hay we advise that equal amounts of soybean seed be mixed and grown with them. The cowpeas are more of a trailing vine nature and the soybeans help to hold them up. A tremendous crop of high protein analyzing feed can be grown by this method.

Cowpeas have foliage very susceptible to the action of frosts. The same frost which might cut cowpeas clear to the ground might not injure soybeans at all. A good illustration of this can be seen on page 51, which shows Blue Ridge Ensilage corn, three rows of soybeans, each of a different variety, not injured at all by frost, growing green and thrifty next to rows of different varieties of cowpeas all of them practically killed by early and light fall frosts.

Be sure to inoculate your cowpeas using our soybean-cowpea bacteria inoculated soil, which is thoroughly inoculated with the bacteria of both legumes, as can be seen by the nodules on the roots of cowpeas and soybean illustrated in this book. This will make it unnecessary to purchase separate inoculating material for the two legumes when they are to be grown together. The growing of cowpeas has done more for the improvement of the tens of thousands of acres of so-called worn-out South-

ern soils than has been done through any other agency. The cowpea is called the "clover of the South."

The Black Cowpea

The black cowpea is a very prolific seed bearer and also a heavy forage producer. Very few varieties can excel it, either as a soil improver or for producing maximum amount of hay.

The Whippoorwill Cowpea

This variety is one of the best known varieties of cowpeas and is an upright grower and much earlier in maturing than the Black variety. Recommended for easy harvesting.



CANADA FIELD PEAS

Land is becoming so much more valuable in some dairy sections of Ohio, Pennsylvania and New York, that the owners of such land feel that in most cases they can raise much more high grade milk producing feed from growing cultivated crops on it than from allowing it to remain in pasture. To follow out a system of growing green crops for forage all the whole growing season is called the **soiling system**. Canada field peas occupy a very leading position for the purpose, since they are the first crop in the spring to be planted.

To secure the best results with this early legume crop we advise that one bushel or more of Canada field peas be first sown broadcast per acre on well prepared ground, drilling them in three inches deep if possible. Then if one dares to risk waiting several days, wait that long and sow one or more bushels of large growing oats per acre, drilling in the oats shallow. The plan in mind is to give the field peas a chance for a good start.

The oats and peas sown together give a much larger crop of green feed or hay than either sown separately. Canada field peas are legumes and to secure the best results from them, both for crop and for soil enrichment, we advise our customers to order liquid culture inoculation material from us if they are unable to secure inoculated soil. Many dairy farmers make a practice of making ensilage of what is left of the field of Canada peas and oats after feeding them green up to nearly time for maturity. They, like most legumes, are wonderful milk producing foods, due we suppose to large protein content. Progressive dairymen should grow much more of them in the future.

Canada field pea hay analyzes 13.7% protein and the silage is very rich, analyzing 5.9% protein. It was proved at Cornell Experiment Station that if oats were grown with field peas which were inoculated the oats would be far richer in protein. So for the good of the oats as well as for that of the field peas do not neglect to inoculate them. We can furnish you the very best of liquid culture inoculation.

STONE'S FANCY QUALITY CLOVER GRASS SEEDS

We buy and sell only one grade of clover seed and that is the purest and the highest germinating seed we can buy. The best is none too good for us; neither is it too good for the other fellow. We undoubtedly could sell several times as much seed as we have done if we would handle some cheaper grades of seed, which could be sold for \$1.00 or \$2.00 per bushel less, but we believe it would be poor business policy for us to do so. For the great majority of customers will remember the quality long after they have forgotten the price. That would apply to poor quality of clover seed even more than to good. We consider clover seed containing bad weed seed about the greatest curse which can be brought onto a farm. If you order clover seed from us you may rest assured that we will ship you the very best we can find in Ohio.

It is folly for you to sow expensive grass seed and expect to get nice meadows, pastures or lawns unless you make sure that your soil is well-sweetened with lime. **Lime is absolutely indispensable to successful grass production.**

Test your soil with litmus paper for acidity. If you do not understand how to do this, we will be pleased to instruct you. We are in position to furnish to you as fine quality agricultural lime as we can furnish grass seeds. Better write to us at once about the agricultural lime needs of your soil. Thousands of bushels of high-priced grass seed are practically wasted by Eastern Ohio farmers every spring, because they are sown in soil so sour that they can do no good.

Write to us now!

Medium Red Clover (*Trifolium Pratense*)

Red clover is the greatest of all hay crops which we can grow generally speaking in the Northern States, although it will not thrive on water soaked or acid soils. When cut soon after blooming a second good crop can be cut the same year either for hay or seed. One of the best crops we have ever seen grown of the best of legumes for all conditions was grown by one of our next door neighbors several years ago. From an eight acre field, he harvested thirty-two loads of first crop clover hay and from the big second crop, which looked, before heads ripened, like eight acres of solid red clover blossoms, he threshed twenty-four bushels and ten pounds of cleaned seed which he sold right on his own premises at \$10.00 per bushel. He secured his crop right after lining this field for the previous wheat crop. An adjoining field, not limed, had in the previous season, yielded only nine loads of inferior hay from eight acres.

The seed may be sown by several methods and under different conditions. We think by far the best results may be secured by seeding it with a thin stand of early maturing oats like our well known Sixty-day oats. The oats crop is harvested before it harms the young clover too much by robbing it of its moisture supply. The old method of sowing clover seed was to sow it on a quiet morning in February or March, just while the ground was honeycombed with frost. Many experts now advocate sowing clover seed with a special grass seed disk drill after the ground is fairly well settled, so that driving over the wheat field with machine will not cut up the field.

Mammoth Red or Sapling Clover (*Trifolium Pratense perenne*)

This variety of clover is somewhat similar to medium red clover and seed looks almost like the seed of medium red clover. It is later maturing than is the medium red clover. It is often sown with other later maturing grasses like timothy. The quality of mammoth clover is not so good as that of medium clover, but it has a great many friends. The first crop of mammoth clover hay is apt to be very noticeably larger than first crop of medium clover.

Sow the same amount of seed per acre as one sows of medium clover. Seeds of most clovers weigh sixty pounds per bushel.

Alsike Clover (*Trifolium Hybridum*)

This valuable variety of clover has a very small dark green seed and requires only about half as much seed per acre as the red clovers require to secure good stand. It is more hardy than the other varieties of clover and will do well on soils too wet or too acid for production of red clover. It does not grow so tall as does red clover, but makes a very solid crop of forage of fine quality. A very large proportion of farmers are now making a mixture of timothy, medium clover and alsike clover. This makes a very heavy crop of high quality. Many progressive farmers are sowing with this mixture enough alfalfa seed to give one quart of alfalfa seed per acre.

If the alfalfa thrives it will improve the quality of hay considerably, will help to inoculate the soil for alfalfa in case one should ever intend in the future to grow it there and will also add to the good chances of following corn crop. We have found out, however, since liming our fields that the alsike clover grows so very thrifty that it crowds too much of the red clover out. A quart of alsike clover seed per

acre mixed with the other grass seed will add a considerable amount of hay per acre in the new crop. Alsike clover will often live over and help to make additions to hay crop, on the following years, while the medium red clover does not benefit us but little the second year.

Kentucky Blue Grass (*Poa Pratensis*)

Perennial. Also known as June grass. Very well-known. Grows as the natural pasture grass on fertile soils all over the Corn Belt. If sown alone for pasture, use about 40 lbs. seed per acre. It takes quite a while to get a good start but is the best of all the native grasses for pasture. Grows from 10 to 16 inches tall. Standard weight of seed is 14 lbs. per bushel, but the quality of seed is so heavy that it will test 20 to 25 lbs. per bushel.

Reb Top Grass (*Agrostis Vulgaris*)

Perennial. One to two feet high. This grass does well on sour soils and will often thrive in locations too wet for other grasses to grow at all. Sow 10 lbs. seed per acre. Do not sow this seed on well-limed soil, because red top grass does not like lime.

Orchard Grass, (*Dactylis Glomerata*)

Perennial. Two to three feet high. This grass is well-adapted to hard conditions, because it will grow and thrive in shady places and on poor soils, where other grasses would die. It yields considerable forage, but we advise customers to sow it as a pasture grass seed alone and then only where other grasses will not do well.

Special Grass Mixture

We have made a study of the subject of seeding meadows and permanent pastures on different types of soils in the corn belt. Send us a concise statement of the condition of fertility of your soil, its composition, whether clay, muck, shale, sand or gravel, the type of subsoil, the drainage, natural and artificial, and the purposes for which you wish to use the grass crops. We will take pleasure in filling your order for a mixture of such grass seeds as will best fit your conditions and charge you only a fair price for the different kinds of seed used.

Velvet Lawn Grass Mixture

The body of our lawn grass mixture is the very finest quality of Kentucky Blue Grass Seed that we can purchase anywhere. With it we mix seeds of the varieties of grasses best adapted to the production of a fine close and dark green turf, most desirable in lawns. A number of these varieties of grass seeds are very high in price, but since their place cannot be taken by other grasses in producing the very best results, we therefore use them in our lawn grass mixture, although they add to the cost. We prepare special mixtures for shady locations and for steep banks and terraces.

White Dutch Clover (*Trifolium Ripens*)

This is the great pasture clover of the corn belt, which is appreciated so much by those farmers who have it. It grows about 6 to 8 inches tall at the best, but is very rich in protein, making in combination with Kentucky Blue Grass, the very finest of pasture. It is used in practically all lawn and pasture seed mixtures. It is a legume and will not grow without plenty of lime, but if you would give to your old pastures a liberal dose of Kelley Island lime, the white clover would stool out over the ground and grow luxuriantly.

German Millet

This is a great and well-known forage plant. Sow one bu. (50 lbs.) per acre on well prepared soil any time in May or June. Millet hay will endure an unusual amount of wet weather at harvest time without injury.

Hungarian Millet

This variety of millet makes a finer quality of hay and is much earlier in maturing than other varieties but does not yield so well. It may be sown as late as the middle of August with fair crops resulting. Sow one bu. (48 lbs.) per acre.

DWARF ESSEX RAPE

This is one of the most valuable of all crops intended for soiling or for pasture and yet in spite of its great value in that respect it is, comparatively speaking, used by but few farmers. It has been esteemed very highly in England for perhaps a hundred years or more as a pasture crop for sheep. It belongs to the cabbage family and sheep, especially, are very fond of rape. A whole field is planted to Dwarf Essex Rape. One side is fenced off by means of hurdle fences and sheep are turned on the rape which is eaten down one section of the field at a time. By the time all the field has been gone over the first sections used will be growing up rank again. A field of rape is an inspiring sight to a stockman who knows its great value as a sheep and hog pasture. Everyone interested in the successful and economical production of pork should secure a copy of Bulletin No. 242, Forage Crops for Swine, issued by Ohio Agricultural Experiment Station at Wooster and study the remarkable gains made by swine on rape pasture, compared with more ordinary feeding.

There is a chance now to make a lot of honest money, growing hogs on our eastern farms, more so perhaps than with any other class of fat stock. Hogs do best on large leafy succulent crops containing but a small proportion of indigestible stalks and stems, eating of course a fair amount of corn at the same time.

Dwarf Essex Rape is very easily grown. Ground should be prepared for it early in the spring and the seed sown in rows about 28 or 30 inches apart. The seed is very fine and can be sown through the grass seed box of a combination grain and grass seed drill; by turning the tube spouts down into holes of grain drill. Or perhaps a better way would be to mix 3 to 4 pounds of Dwarf Essex Rape very thoroughly in the fertilizer which you intend to use on each acre of your rape field, so when you sow

fertilizer with grain drill you will sow rape seed at the same time, through every fourth hoe of drill. Then cultivate the crop once in a row a few times with a one-horse cultivator. Under favorable conditions you will have a very fine crop, three or four feet high, a crop which will make your hogs fairly grunt with pleasure. One of the best things in connection with this profitable way of growing hogs is the fact that all of the very valuable excrement from them is deposited fairly evenly over the whole field which they are harvesting for you without labor. Perhaps it may sound the other way to some farmers, but we think that an intelligent business farmer should use every honest way he can to lighten his work and increase his net income. At present prices it takes about six fair-sized hogs only to bring in about \$100 in cash. Why not go after a few of the \$100 bank notes in 1916, by growing a good rape field and turning a bunch of good shoats on it after it is well started.



DWARF ESSEX RAPE PLANT

Good Specimen nearly three feet wide, which grew in same row with Stone's Roosevelt Soybeans.

We handle one grade only of Dwarf Essex Rape Seed and that is the very best, highest-germinating, purest seed we can buy in America. We advise you to order your supply now and order plenty of seed, because if you have sheep or lambs on the farm, we want you to sow Dwarf Essex Rape in your corn field next fall, along with some winter rye, and winter vetch seed before the last cultivation of corn. Then after your cornfield is cut and corn is husked, what a happy, delightful, prosperous time your sheep and lambs will have trying to eat up all the rape. With good luck you will have from one to three feet of growth all up over the field, and that growth will hold there until finally hard winter weather in January will cause it to die down. We call this good farming. Your sheep will agree with us if you try them on Dwarf Essex Rape. If seed is sown broadcast, use twice as much seed per acre as when sowing in 28 inch rows to be cultivated.

In June, 1914, we sowed some Dwarf Essex Rape seed mixed with soybean seed in 28-inch rows. The rape attained a very large size by fall and did not seem to injure the soybean growth at all, but we believe the inoculated soybeans helped very much the growth of the rape. This combination of soybeans and rape furnishes a very good plan for hog pasture since the rape will continue to grow and thrive until winter, long after the soybeans are gone.

OATS

It is surprising what a large proportion of farmers are raising all kinds of old mixtures of oats instead of growing some one of the very high-producing newer varieties. The new and improved varieties which we are offering for sale to our customers are the best varieties of which we have definite knowledge. All of the seed oats we are offering for sale are grown by the very best class of intelligent progressive farmers right in close proximity to us here, except of course what we grow ourselves on the home farm.

We clean these oats over a good fanning and grading mill in order to screen and blow out the weed seed, light oats, chaff, straw, sticks, etc., found in oats after being threshed.

Oats do their best in a cool climate. Judged by the average conditions of climate in Ohio as determined by reports of the weather reporters from all parts of Ohio for many years, we have the coolest climate here of any part of the State. The climate here therefore is very well suited to the growing of oats.

Sixty Day Oats

This variety of oats is now in great demand all over the rich farming section of the eastern states. It has two or three very good points in its favor which put it in a class above in advance of almost all other varieties.

It is the earliest of all good varieties of oats. It is one of the very heaviest yielding of all varieties of oats tested by Ohio Agricultural Experiment Stations and they have tried out perhaps 140 varieties of oats. It has about the shortest straw of any of the good varieties. This is very important to the farmer who possesses a good rich soil, because on such a soil large growing varieties of oats are almost sure to cause trouble in harvesting it if summer storms are at all common. How much hard work and worse language has been caused in the past by the sowing of large-strawed varieties of oats we may never find out, but Sixty-day Oats are a great boon to the very best farmers all through the corn belt. They can get the big yield of oats without having a mess of five or six foot tangled down straw to handle. Sixty-day oats are in greatest demand however as a nurse crop for either alfalfa or clover. They are a very small-berried oats and stool out well on good soil so that, when used as a nurse crop with grass, one and one-quarter bushel of seed per acre is a great plenty. They are yellow in color and are a branching variety.

Siberian Oats

Siberian Oats have an eight years' average of 10.45 bus. per acre at Wooster Experiment Station, per year, which puts them up at the top notch. These oats are tremendous yielders. Our seed coming from stock raised in a crop standing as high as a man's head and yielding 36 bushels per acre, thrasher's measure. We have thoroughly re-cleaned our oats and they look very attractive. Our stock is bound to go quickly, so order early. Siberian oats are white and yellow in color, have fairly stiff straw of good height, and ripen at about the average date that most other varieties ripen. Seed is large sized and we advise 1 1/2 or more bushels per acre for full seeding.

Swedish Select Oats

Probably no variety of grain has ever had such extensive advertising as has this variety of oats. They are certainly a grand variety of white oats of branching type. They don't grow on the average quite so tall as the Big Flour. We know that down in Wayne county at Wooster Experiment Station, Swedish Select oats do not yield nearly so well as other varieties. Yet up here in Portage county, we know of their yielding between 30 and 35 bushels per acre on soil not nearly so fertile as that at Wooster Station. If our customers should judge our oats by the size and weight and looks of the seed grain we would be apt to sell all of our Swedish Select Oats before we sell any other kind, because they are certainly the nicest looking seed oats we have ever had. Send in your orders early for seed oats, especially of this variety because there is sure to be a large demand for them, especially for the Swedish Select and Sixty-Day varieties. We advise the sowing of from two and one-half to three bushels of Swedish Select oats per acre on account of size of the seed.

EARLY ORANGE SORGHUM

This is a variety of sorghum especially valuable as a forage plant for fall feeding purposes for cattle. Very few men who grow sorghum for this purpose but what are very enthusiastic over its use. It is drought resistant, grows very fast, and is a tremendous forage yielder. On account of its being so sweet, it is very much relished by swine as well as by cattle. Ground should be carefully prepared for sorghum planting because seed is small and needs a good seed bed for a start. Use about 20 pounds seed per acre if planted in rows far enough apart to be cultivated and plant from one to two inches deep. If sown broadcast use about 15 pounds seed per acre. The first crop may be cut for feed almost any time up until it is nearly ripe. If it is cut early it will sprout up and make second crop, but exercise care and judgment in feeding the second crop. If desired more for syrup we advise our customers to order us to get the Early Amber Sorghum for them. A yield of thirty tons of green sorghum feed per acre is nothing very unusual on good rich warm soils.

PEDIGREED SEED WHEAT

No farmer can really afford to grow any variety of wheat other than the best, considering the price of labor and the investments of other kinds for the crop. Wheat growing in the U. S. gives promise of being fairly profitable for several years to come on account of the demand for it from the European war zone. If ever there was a time to grow the very heaviest yielding varieties of wheat to fertilize them heavy and give them good care it is in the immediate future.

Several years ago we secured from Prof. C. G. Williams, Chief of Agronomy of Ohio Agricultural Experiment Station, small quantities of five strains of his wonderful pedigreed varieties of wheat for trial. Our seed wheat has been propagated from this very small start. These strains of wheat have all been yielding much more grain and straw than the original varieties from which they were selected. The increased yields of grain we believe come mostly from the increased size of the heads compared with ordinary wheat.

Last fall we threshed a field of our Pedigreed Poole Wheat which yielded $43\frac{1}{2}$ bushels per acre, by far the largest yield we have ever had, for our farm is not well adapted to wheat production. This field was planted about October 1st, 1913. It had grown a crop of soybean hay. This stubble was disked and the wheat was sown with a disc drill and fertilized with acid phosphate. This field had been well limed for corn with the Kelley Island Ground Limestone. It was a very profitable crop.



COMPARATIVE EFFECTS OF FROST

Blue Ridge Ensilage Corn at right, soybeans in center and variety of cowpeas at left. Note that the cowpeas have been severely injured by early frost; while soybeans and corn are but little if any injured.

Pedigreed Gypsy Wheat No. 6100

This variety of wheat is a bearded one. It is a very hardy variety of winter wheat and we believe is the hardiest of all of the pedigreed strains which we sell. It is a red wheat, grows about 48 inches tall and is very resistant to lodging. Its average yield at Wooster, O., Station in grain is $42\frac{1}{2}$ bushels and in straw is 4751 lbs. per acre. To say that it is a very good variety is putting it very mildly. It is yielding 4 bushels more per acre than ordinary Gypsy wheat.

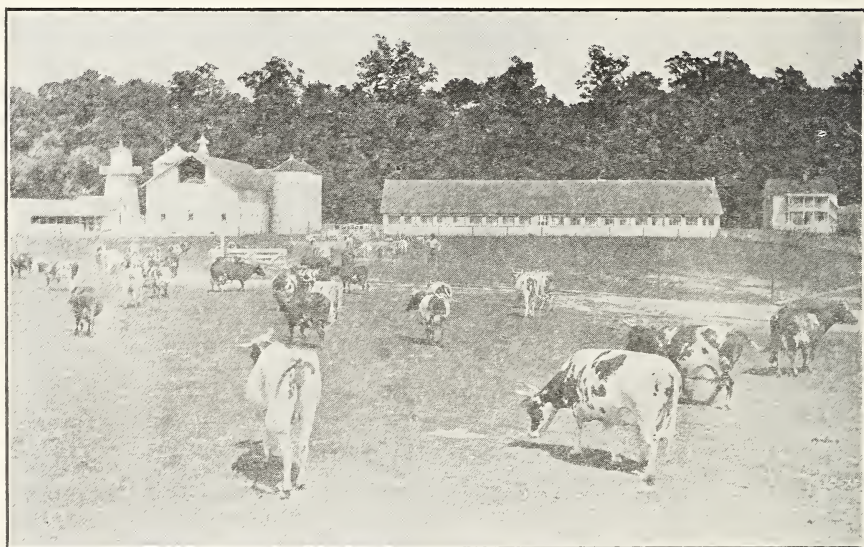
Pedigreed Fultz Wheat

Our Pedigreed Fultz Wheat is a mixture of No. 5309 and No. 5310. It has a 3-year average yield at Wooster of over 44 bushels per acre or $4\frac{1}{2}$ bushels more per acre than the regular strain of this variety. It is a red-berried, smooth-headed wheat with a white chaff. Heads are very large. Fultz wheat has always been such a favorite that this variety is apt to be the first one to be sold out this coming season.

SILOS AND SILAGE CORN

We know of no one thing, which has stirred up such an enthusiasm in the feeding of live stock, especially of dairy cattle as the silo has done. If any man ever spent even one year at dairying he would know without any more experience that it is practically impossible to keep up as good a flow of milk in winter time on dry feed as in summer time on grass. Now the silo has made a remarkable change in that respect. No farmer who has a silo, plenty of good protein hay and some concentrated food to balance up the ensilage properly, needs to be afraid of his cows going dry on account of having no grass to eat. In fact many men are now filling smaller sized silos for summer use at the same time that they fill the larger ones for winter use, so that they are in shape to feed silage the year round to their cows. The summer silos are made smaller in diameter than those for winter use so that the ensilage may be fed off fast enough not to spoil.

If one gets into a crowd of dairymen, anywhere either at a wedding or a funeral, he finds the interest in ensilage can't be held down, and that some one is almost sure to mention the word silo inside of a few minutes. It attracts more interest than alfalfa discussion, because every farmer can grow some kind of ensilage corn, but many can't grow alfalfa at all, not to speak of getting a satisfactory crop.



View of some of the silos and dairy barns on the famous South Farm at Willoughby, O. The expert manager of this great Ayrshire dairy cattle farm, Mr. Geo. A. Cross, told us that they put up about 1,000 tons of soybean-corn silage last fall to use in feeding their best record-breaking milk producers. He is a firm believer in soybean-corn silage for large as well as economical milk production. Thousands of the best dairymen in America believe this to be true and the number of believers is increasing very fast.

Dec. 21, 1914.

Mr. Wm. McD. Stone,
Atwater, Portage Co., Ohio.

Dear Sirs

I am sending you photo of our champion two-year-old Ayrshire Lessnessock Buntie No. 31685, record 14,678 lbs. milk containing 512.40 lbs. butter fat. We have 11 two-year-olds with records better than ten thousand, and three with records over twelve thousand. We also have an ex-champion three-year-old with a record of 15,056 lbs. milk, 589 lbs. fat. These cows were fed on Soybean-Corn Silage. I wish to state that the Soybean seed that I bought of you last April was perfectly satisfactory and you may plan on me for a much larger order next spring.

Very truly yours,
GEO. A. CROSS.

We have many requests for information about silos and ensilage, which we try to answer as well as time and our knowledge will permit. Most all of the silos which are now widely advertised are good silos, but some makes of silos are unnecessarily costly and don't make any better ensilage than well built silos of other construction costing less than one-half the money. The principal points to keep in mind in silo construction are, First: Put in a good solid concrete foundation; well underdrained so that frost won't crack it. Second: Be sure that walls are air-tight, because air will spoil the silage. Third: Every kind of silo should be well braced with either strong iron rods, wires or wooden hoops to hold solid and tight even under very severe lateral strain. Fourth: For ordinary size dairies don't build silos over 10 to 12 feet in diameter or you can't feed it off fast enough to keep ensilage from spoiling. A silo 14 feet in diameter will hold a tremendous lot of feed in only one or two inches of depth. Rather than build silo larger than this in diameter, we would advise to build it higher or else build two of them.

Concrete silos on good solid foundations and well reinforced throughout make good ones. Tile block silos are very good ones if no mistakes are made in construction. They should however, have iron bands or hoops around them at reasonably close distances to prevent cracking of the wall, which often happens if walls are not braced in that way. Those who own stave silos held together by outside hoops only should keep a watchful eye on the hoops during summer and early fall when they are empty, or they are apt to be blown down during heavy storms when the hoops and staves are loose. Lath and plaster silos and the famous elm hoop silos are the most cheaply constructed silos of any because there are no patent rights, nor agents' commission, nor fancy material for which to pay and it does not require a high-priced architect to draw up plans for their construction.



FOUR EXCELLENT VARIETIES OF LARGE ENSILAGE CORN
 Stone's Eureka. "Blue Ridge." "Old Virginia." Virginia Red Cob.

ENSILAGE CORN

We make a specialty of supplying seed corn for growing ensilage specially suited to the different needs of our customers. In the following list of varieties of seed which we sell, you are practically sure to find a variety suited for your needs.

Last year we sold a tremendous lot of ensilage corn and this year indications point to much larger sales, because our seed corn which we sold last year gave such good satisfaction. The largest varieties of ensilage corn we sell come from the south and are giving remarkable heavy yields of ensilage per acre on Ohio soils, but for New York, Michigan and other states farther to the north we would not recommend any of these with the possible exception of the famous Blue Ridge Ensilage corn. Our northern Ohio varieties like Leaming Pride of the North, etc., would be better suited to conditions in these more northern states. Order your seed corn now even if you don't want it shipped until April or May.

We want to be prepared for the rush of spring shipping when it comes and have on hand a plentiful supply of good ensilage seed corn with which to fill our orders. If you send your orders now we will have the best chance to engage enough of the best grade of seed. We try to make quality of seeds and service to customers of first consideration, but if you want to save a little on the price ask your neighbors to club together with you, and ask us for prices on large quantities. But send us your order early. You will help yourself, as well as us, very much by so doing.

Experiments at the Wooster, O., Experiment Station have shown very conclusively that it pays to plant ensilage corn very much more thickly than field corn. In a favorable corn year ensilage corn planted 4 inches apart will give nearly 50% more tonnage per acre than if planted 6 inches or farther apart and taking the five years average of trials for 4-inch, 6-inch, 10-inch and 12-inch plantings, the 4-inch plantings have given an average yield of 30% more nutriment per acre than any other planting. This is conclusive enough to satisfy us.

Do not plant your ensilage corn as deep as you would ordinary northern Ohio acclimated seed corn, especially if the soil is cold or wet. Its vitality is not quite so strong under adverse conditions. We believe that a large proportion of farmers do not appreciate at all the value of clover sod plowed down for corn. Alfalfa sod is of course even better. If from 8 to 12 loads of good stall manure, each load covered with about 40 or 50 pounds of acid phosphate, is applied with a manure spreader to each acre of clover sod at some time during the previous fall or winter, then the farmer will have about the best possible chance to raise a bumper crop of corn, providing he has good seed of a good variety and gives the crop proper care. Judging by what we have seen in years past, we doubt if many farmers have ever tried their very best to grow a big crop. Acid phosphate is now very cheap in price, but it is just as valuable as ever in increasing the yields of all kinds of crops and helping them to mature at an earlier date. For every dollar spent on acid phosphate for corn, about eight dollars will be returned to the investor in increased value of the following four or five crops.

Seed Corn.

There seems to be a prejudice in the minds of a few prominent agricultural authorities in Ohio against the use of any Virginia-grown corn as seed for an Ohio ensilage-corn crop. Their position in regard to the matter is rather hard to comprehend, because we would naturally suppose that they would recommend what Ohio Agricultural Experiment Stations had proven by careful test to be the best.

In a 5 years trial at Wooster, O. Experiment Station of 8 varieties of large-growing corn for ensilage production, seed from a Virginia-grown ensilage corn has made the following records:

- The largest weight of ensilage per acre.
- The largest weight of protein per acre.
- The largest weight of crude fiber per acre.
- The largest weight of Nitrogen-free extract per acre.
- The largest weight of fat per acre.

And furthermore it produced on the average over one-fourth more nutriment per acre than a standard variety of Ohio-grown Leaming corn.

If the above evidence is not conclusive enough as to the wisdom of Ohio farmers growing a good variety of Virginia ensilage corn for silage, then we would like to know what conclusive evidence is. Since the sales of our Virginia-grown ensilage corn are making a very large gain each year over the previous year's record we are confident that our customers will continue to buy what has been proven to be the most profitable seed corn for their special purposes in spite of any amount of advice to the contrary.

Stone's Eureka Ensilage Corn

This is one of the largest varieties of ensilage corn in the U. S. It grows remarkably large wherever it has a fair chance, stalks 15 feet high and counting 21 long wide blades being nothing uncommon. It is a good ensilage corn to ear, generally setting two ears per stalk as often as "Old Virginia" sets one. Eureka seed corn kernels are about the size of graded field corn seed, so that it does not take nearly so much seed of this variety to plant an acre, as it takes of the other varieties of Virginia ensilage corn.

Our sales of this variety in 1915, totalled fully double as much as those of 1914 and we expect another large gain in sales of this variety in 1916, because this seed corn is certainly producing remarkable crops of ensilage. Last fall it was our pleasure to see a very fine crop of Stone's Eureka Ensilage Corn on the beautiful dairy farm of Mr. Fred. G. Webber of Kinsman, O., who is one of the most progressive farmers in that part of Trumbull County. This field of great tall corn was certainly an inspiring sight. Order seed of this variety very early if you wish to be sure of getting a supply. Notice the illustration of growing crop of Stone's Eureka Ensilage Corn on front cover of catalog. Photo was taken just as corn was beginning to tassel. This corn was planted on June 25th in a field which had been growing soybeans several years in succession. The growth of the Stone's Eureka Ensilage came very largely from the nitrogen added to the soil by the nodules or tubercles on the soybean roots, such as those seen on the back cover of catalog.

Blue Ridge Ensilage Corn

This is a variety of ensilage seed corn which is produced on farms located up in the Blue Ridge Mts. Since it has become acclimated to a much higher altitude than most ensilage seed corn, it naturally matures seed from one week to ten days earlier than varieties of corn like Stone's Eureka and "Old Virginia." It does not grow nearly as tall as Stone's Eureka nor make nearly as many tons of silage per acre. Blue Ridge Ensilage Seed Corn is all of the very best quality of graded stock. The kernels are all very large, nearly twice as large as ordinary kernels of corn, so we advise our customers to plant at least 12 qts. of seed per acre in order to get a good stand. It takes an unusually long time for this seed corn to reach us by freight, for it comes by such a roundabout way. Sometimes we sell out of this seed early and late customers have to wait a long time before we can get more seed of this variety. So if you can do so, we advise you to order in February.

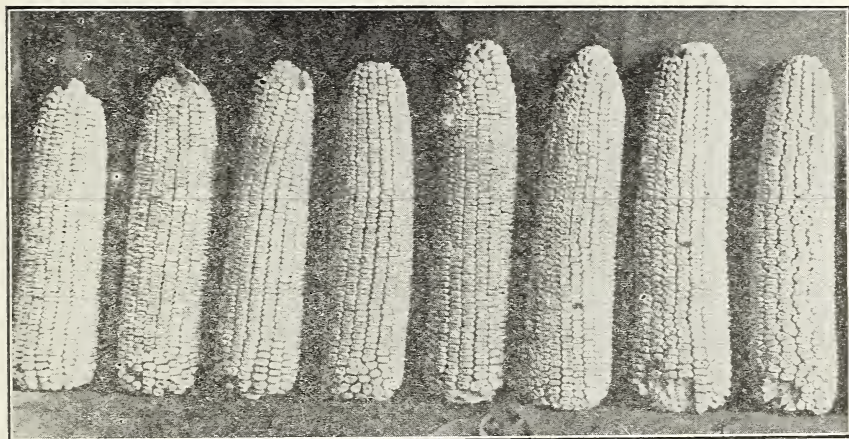
"Old Virginia" White Cob Ensilage Corn

This is one of the most popular varieties of ensilage corn in this part of Ohio. The seed is grown in Virginia and we aim to buy the best grade we can get. This corn is a tremendous cropper. Five to eight acres of it will ordinarily fill a good sized silo clear to the top with some left over. The kernels of seed are very large and the stalks if far apart will be about the size of a man's wrist in circumference. We advise our customers therefore to use from ten to twelve quarts per acre of the "Old Virginia" Ensilage Seed Corn. Thousands of bushels of seed corn of this variety are now used in eastern Ohio for ensilage seed. When thousands of the most progressive dairymen will use this seed corn for ensilage one year after another, rest assured that it must have remarkably satisfactory qualities.

"Virginia Red-Cob" Ensilage Corn

This is a variety of southern ensilage corn which resembles "Old Virginia" very much in the looks of the kernels; but this variety of corn has large long white kernels on a red cob while the "Old Virginia" Ensilage has large white kernels on a white cob. This variety of corn is earlier in maturing than is the "Old Virginia" and consequently does not grow quite so tall nor make such a big tonnage. Some of our customers have such rich land that their complaint about "Old Virginia" is that it makes too large a growth.

Red Cob Ensilage corn matures at about the same time as "Blue Ridge" Ensilage. It certainly grows large enough on fertile soil to suit a great many farmers.



JOHNSON COUNTY WHITE SEED CORN.

These are not show ears but ears picked from regular seed corn supply.

Johnson County White Corn

This is the most famous variety of show corn in the world. It is a large white corn which has received a great deal of careful breeding for exhibition purposes, in the class of largest and most perfect ears. L. B. Clore of Indiana has attained a world-wide reputation as a corn breeder on account of his wonderful achievements in perfecting this variety of corn for show purposes. A few years ago, he won \$1,000.00 in prizes on a small exhibit of this variety at the National Corn show. It is hardly necessary to say that his chosen ears of corn were the finest looking ears of seed corn in the United States.

Johnson County White Corn is suitable for grain growing in southern Ohio, where it could not be excelled if even equalled in that respect by other leading varieties. We are recommending it to our customers in northern Ohio as a wonderfully good variety to grow for ensilage in cases where the ensilage is wanted for fattening cattle. This variety will give a tremendous crop of ears and very large fodder as well. While it will not give as large a tonnage of ensilage per acre as will our regular ensilage varieties, yet it would be far superior to practically all of our native northern Ohio varieties in the production of ensilage as judged by both tonnage of grain and tonnage of stalks per acre. One of our customers reported nearly twice as much ensilage per acre from our Johnson County White Corn as from his native variety.

Many farmers who will not plant southern ensilage corn will try to fill their silos with their ordinary-sized native varieties of corn. We have known some men to put about 20 acres of their field corn in one silo, 12 feet in diameter and 30 or 35 feet high. Then they would have to buy ear corn to feed that winter to other stock, because they had put all of their own corn in the silo in order to get enough bulky feed for their cattle. Why not grow about one-half or two-thirds as much Johnson County White Corn for filling the silo and plant other corn for husking.

Boone County White Corn

This is one of the finest varieties of large white corn grown in central or southern Ohio either for show purposes or for market. It is also a great favorite in any other state where the climate is suitable for growing a large late maturing corn. Ears of Boone County White Corn contains from 18 to 24 rows of very deep, white kernels with large germs on medium sized white cobs. It is one of the very best types of white dent corn for the Central Corn Belt and is one of the prize-winning white dent varieties of corn. The ears are in the cylindrical order and are usually ten or more inches long. Kernels are a little on the rough order, which is commonly the case with deepkerneled varieties of corn.

Reid's Yellow Dent Corn

This variety of corn was originated in 1846 by Robert Reid, a Buckeye farmer, who had moved to Red Oak, Ill. It was a cross between an Ohio and an Illinois variety. This is the most popular yellow dent variety of Ohio corn at all the shows. If any man wishes to grow a variety of corn from which to pick fancy show ears then let him grow the Reid's Yellow Dent. A fine selection of Reid's Yellow Dent ears is a very beautiful sight. Ears of Reid's Yellow Dent are cylindrical in shape tapering gradually to the tip. Ears are $9\frac{1}{2}$ to $10\frac{1}{2}$ inches long with circumference of $7\frac{1}{4}$ to $7\frac{1}{2}$ inches. Cobs are red and cobs and shank are both small. We do not recommend this variety for northeastern Ohio for grain production because it is too late a variety. It is a very good variety for very good corn land when the growing season is long enough.



TYPICAL EARS OF FIVE VARIETIES OF OHIO CORN.

Leaming. North White. Clarage. Reid's Yellow Dent. Boone County
Improved Leaming Corn

Leaming corn was originated by J. S. Leaming in Clinton county, Ohio, in 1856. By continuous selection he fixed the type of this variety and his sons are growing it now. Our seed is an improved strain grown up close to Lake Erie in the central part of Ohio. The ideal stalk is of medium height with a large number of broad leaves. Ears should be not to high from ground and stalks produce two ears under favorable conditions. With good care and soil it is possible to grow 100 bushels per acre of this variety of corn. It is a very great favorite as a field variety all over Ohio, especially in the western part. We know that our seed which we secured from Northern Ohio last year ripened well for customers located within a few miles of us in spite of a very short growing season. This variety is a favorite variety for ensilage in New York state and we ship a big lot of seed into that state for ensilage growing. This variety would also be well suited for Michigan dairymen's needs also. The ears of this variety run from 8 to 11 inches long and 7 to 8 inches in circumference. Ears have 16 to 24 rows of rich golden yellow dented kernels.

Clarage Corn

This is a beautiful yellow dent corn originated by a Mr. Clarage of Fayette county, Ohio. He selected his corn originally to get early maturing ears, with straight rows of very deep kernels. He also wanted his corn to be very deep yellow in color, with honey yellow cap. He selected his seed corn in the field while the corn was maturing and developed a very good type of corn.

This variety of corn is a great favorite with shippers of market corn, because a carload of it is not only of good quality, but it looks very good. Clarage corn is the great

standard variety of corn grown at Wooster, Ohio Experiment Station in all of their tests. Trials of it made up in this section have not been very satisfactory because it is too late a variety for us. This would be a good variety for ensilage in latitudes farther north than us, where they did not care to have corn ripen up solidly but wanted a big crop of fodder and corn.

We are sometimes in position to sell a limited quantity of pedigreed Clarage corn to those who would like the very best seed in that line. If interested in this, write to us early in the season about it.

Pride of the North Corn

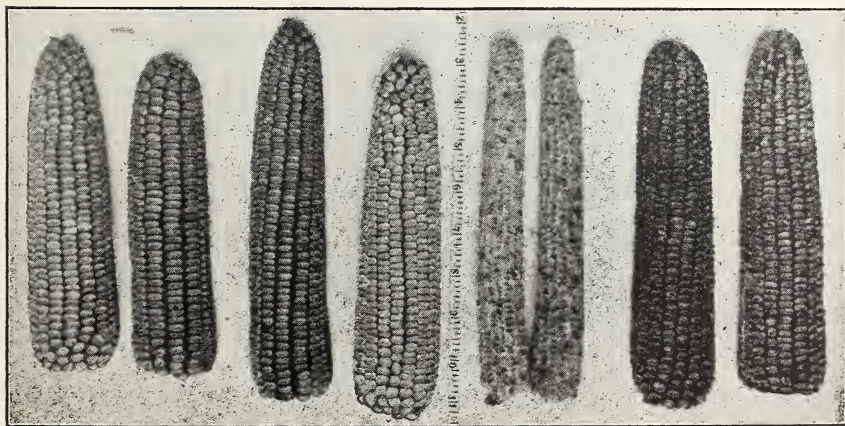
Pride of the North Corn is a beautiful yellow dent corn which has been selected as much as possible for early maturity and a big yield of grain. Ears are of course not so large as Reid's Yellow Dent Corn, but shape of ears are somewhat like it. Pride of the North Corn should and does in many places hold the same relative position in farmer's esalimation in Northern Ohio which is held by Reid's Yellow Dent in central Ohio. The kernels are deep, the cobs are small and red in color and the fodder is of fair size with plenty of leaves. This variety is a great favorite for ensilage in central and northern New York.

White Cap Yellow Dent Corn

There are a great many strains of white cap yellow dent in Ohio, because after all any farmer who crosses a white variety of corn on a yellow one will eventually have a strain of white cap yellow dent corn. The white cap corn which we sell is grown by men who have tried and succeeded in producing a very valuable strain of early maturing corn. Our strain is a little on the rough order and is of a good fair size with deep kernels and not a large cob. We tried the seed last year in the section and it ripened O. K. The principal reason for that in our judgment is: the seed was grown in a more northern latitude than ours. White cap yellow dent is a great favorite among a large class of farmers.

At tests at Ohio Experiment Station at husking time they found that so called ripe crops of corn of different varieties varied in moisture content all the way from 15 to over 30 per cent moisture. Now think of growing corn which is about one-third water and yet that is what lots of farmers do and then they blow about the size of the ears of corn at husking time.

We try to be honest and sensible about our advice to customers in selecting their seed corn. After that it is up to them to buy what they want, but we most certainly hope that for their best interest they will choose early varieties because it is the safest and best plan.



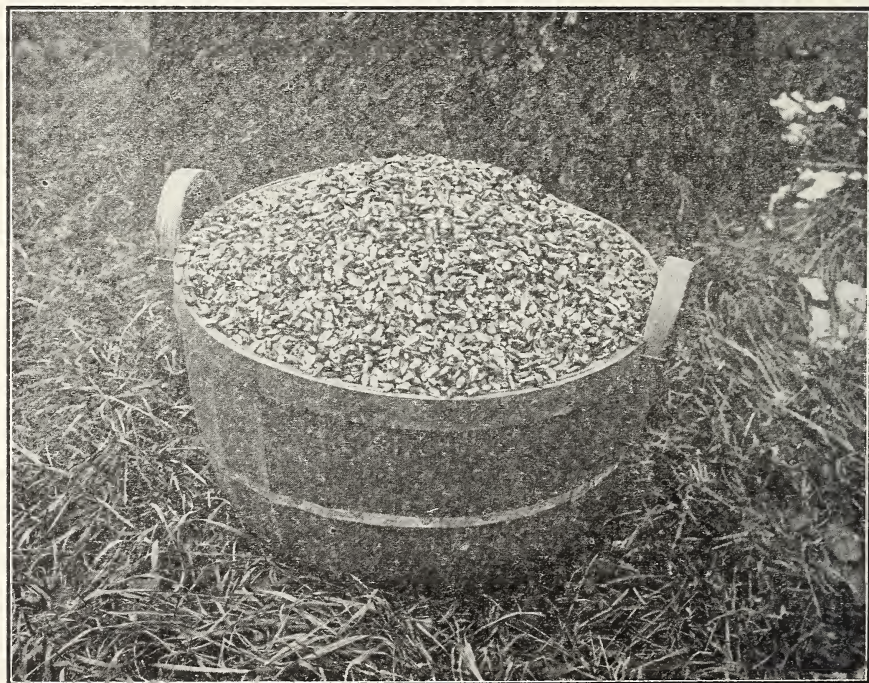
TYPICAL EARS OF FIVE EARLY-MATURING VARIETIES OF OHIO CORN.
HURON DENT PRIDE OF WHITE COBS OF STONE'S CALICO
THE NORTH CAP CALICO CORN

Stone's Pedigreed Early Calico Corn

Portage County is located in N. E. Ohio, about 40 miles south of Lake Erie. As judged by the average meteorological reports of Ohio we have here the shortest growing season, in between late spring frosts and early fall frosts, of any part of Ohio. We must, therefore, grow the very earliest varieties of dent corn if we wish to husk good sound corn. The type of corn best suited to our conditions here is one producing very early-maturing ears of fair size, but possessing very small cobs and deep kernels, so as to give us corn that will dry out quickly and yet give a good yield of shelled corn per acre. Early maturity in corn intended for husking is of prime importance in this part of Ohio. We believe that the early calico corn, which we have been improving for the past eight years by both ear-to-row tests and by selection of seed ears from the standing corn, comes the closest to filling our requirements here of any variety we have seen.

The original start of seed of this variety we secured from Mr. Walter Stratton, of Atwater, whose father had grown a crop of ripe corn of this variety for the previous 28 years. The variety was originally a cross between a very early-maturing red-kerneled corn and a deep-kerneled yellow corn. Fair-sized red-speckled or calico-colored ears (called by some farmers 'Bloody Butcher' corn) have been selected for seed corn each year for the past 35 years, but each crop of husked corn still shows some all-red and all-yellow ears.

Our object in growing and improving this variety of corn is to secure the **highest possible yield of sound dry shelled corn per acre in a short season.** This we are doing by the ear-to-row test plan under rules formulated and followed by Prof. C. G. Williams, Chief of Agronomy of the Ohio Agricultural Station at Wooster, and one of the world's specialists in plant-breeding. To conduct a reliable and satisfactory ear-to-row test requires a lot of very careful and tedious work on about an acre of corn, running from planting time to husking time. It takes such a lot of space in a catalog to give a complete description of an ear-to-row test that we cannot spare the space in this catalog to do it. If any of the readers of our 1916 seed book should like to have more particulars about the work we have done in the improvement of our pedigreed calico corn then write to us for same and we will be pleased to mail to you a more exact description of the work done.



THE STANDARD TEST FOR CORN

Basket of Stone's Pedigreed Calico Corn, sound and dry. The value of a variety of corn cannot be judged by the appearance of five or ten show ears of that variety. The great practical problem before the corn growers of Northern Ohio is how to grow the greatest number of bushels of sound dry shelled corn per acre in a short season. We are trying to do this with our Pedigreed Calico Corn.

Varieties of corn are very much like dairy herds of cattle in this respect that they all contain high-producing as well as low-producing strains. By ear-to-row testing of corn we are able to select the very highest-producing strains and breed our seed corn from them alone, working on the same lines as do the men who are breeding advanced registry dairy cattle. Such cattle are worth at least twice as much as are dairy cattle, which are simply recorded as purebreds. So is pedigreed corn worth much more than the unimproved strains of the same variety for the results of the first ear-to-row alone generally gives an increase in yield of from 8 to 10 bushels of shelled corn per acre.

In favorable years Stone's Pedigreed Early Calico Corn will ripen in 90 days from date of planting. It butts and tips out well and is a very heavy sheller, a number of ears having been found that shelled over 90%. It grows fodder from 8 to 11 feet high and stands up well against most of the summer storms. The writer has never claimed that it was the heaviest yielder of ear corn of any variety in Portage County, because that would indicate a variety of corn, which would take a much longer time in which to mature a thoroughly sound crop. Yet in a carefully conducted test in 1914 of 16 varieties of corn, some of which are well-known in several states, our pedigreed calico corn was beaten by but one variety in yield of sound ear corn per acre, and only one other dent variety had a smaller amount of unsound corn per row and that was only one-half pound less than ours. In one 1915 variety test of corn by Mr. John York of this county, our pedigreed calico corn was beaten by but one variety in yield of sound ear corn per acre and that was by a pedigreed strain of Mr. York's own native yellow corn. In at least two variety tests in 1915, our calico corn gave the least amount of unsound corn of any variety tried. The stock of our calico seed corn is short this season so order early if you wish to get a supply.



FIELD OF STONE'S CALICO CORN

York's Pedigreed Yellow Corn

A medium-early variety of native Portage County-grown yellow-kerneled corn, bred up by the ear-to-row test method on the same lines as our pedigreed calico corn; that is for a very heavy yield of sound corn per acre in a moderately short season. To those who dislike the color of our calico corn, and want an early heavy grain-yielding yellow corn with good fair-sized stalks this variety should appeal very strongly. Seed has been well-cared for and is very fine. Only a limited supply for sale, so order early if you want the highest yielding variety of corn in Portage County.

PEDIGREED ADVANCED REGISTRY SEED

Leading plant breeders in America are now propagating strains of corn, wheat, oats, soybeans, potatoes on much the same lines that the best dairy cattle breeders are now following. For years certain varieties of grain, particularly corn, have been bred or improved for show purposes, just as horses, cattle, sheep, swine, poultry and other livestock has been improved. But the best plant breeders in America are now breeding not for looks but for the maximum yields of satisfactory grain or forage under the limits, prescribed by climatic and soil conditions.

It was the leaders in the dairy industry who first took the great step forward in the practical improvement of cattle by judging their value, not according to size, color, conformation, or breeding, but by their abilities as producers at the pail, through the course of one, two, or three years' work. Breeders' associations which had been organized for the advancement of the interests of the different breeds of dairy cattle in America, have in the last few years established rules and regulations for the registration of the work of certain cows of each breed in an advanced class of their own, when these cows were able to equal or pass a certain mark set for them by the rules of the association to which they belong. This class of cows when they have made their records as producers of at least a certain established mark in milk or butter are called advanced registry cows.



We are showing a half-tone illustration of the herd bull in service on Lone Elm Farm. He comes from the advanced registry stock of the American Guernsey Cattle Club. A study of the milk and butter fat yields of his female ancestors will not only show why he was purchased, but will also show the practical principles which are being used by the best plant breeders of today in increasing the yielding qualifications of different farm crops.

Pinehurst Uneeda King (No. 19497) was purchased from the noted Guernsey farm of E. W. Strawbridge of Moorestown, N. J. His sire is Dairymaid's King (No. 12898), full brother to the famous Dairymaid of Pinehurst, who made a record as champion cow in the great dairy contest in Iowa, several years ago, giving 17285.3 lbs. of milk and 910.6 lbs. of fat in one year. Dairymaid's King is also full brother of Dairymaid's Glenwood of Pinehurst who is

sire of four advanced registry daughters.

Dairymaid's King was sired by Glenwood Boy of Haddon, No. 4605, who is sire of 26 Advanced Registry daughters and of 13 sons who have sired Advanced Registry Cows. The mother of Dairymaid's King is Dairymaid of Elm Place, No. 14197, who had an A. R. record of 12176.9 lbs. of milk and 668.3 lbs of butter fat. She is mother of Dairymaid of Pinehurst, and also of Lady Dairymaid of Pinehurst, who has a record of 9669.8 lbs. of milk and 523.8 lbs. of fat at 2 years, 7 months of age.

The dam of Pinehurst Uneeda's King is Lady Uneeda of Pinehurst, No. 29719, who has an A. R. record of 6122.3 lbs of milk and 327.3 lbs of butter fat at 2 years, 1 month of age. She is sired by Stransford's Glenwood of Pinehurst, No. 13609, five of whose A. R. daughters average almost 448 lbs. of butter fat in one year, all at very early ages. This bull was sired by Glenwood Boy of Haddon, No. 4605 and his dam, Stransford's Princess, No. 11740, has an A. R. record of 12279.7 lbs. of milk and 725.6 lbs. of butter fat.

The dam of Lady Uneeda of Pinehurst is Uneeda C., who has an A. R. record of 9771.1 lbs. milk and 465.0 lbs. fat. Uneeda C is also dam of the A. R. cows, Pride of Sedgeley who has a record of 9166 lbs. milk and 497 lbs. butter fat at 4½ years of age, and of Uneeda of Pinehurst, who has records of 9368 lbs. milk and 390.9 or fat at 3¼ years and 9999.9 lbs. milk and 407.3 lbs. of fat at 5 2-3 years.

How much better will be our chances of securing Guernsey cows of very high production from Pinehurst Uneeda's King than they would have been had we simply purchased a pure bred Guernsey bull none of whose ancestors had ever been officially tested and proven to be very high producers? If a man can appreciate this advantage, he ought to appreciate just as well the advantage of growing pedigreed grain of different kinds.

SPECIMEN EARS OF STONE EARLY CALICO CORN



THE GROWTH OF OUR FARM SEED BUSINESS

Each year since we started our farm seed business, we have been wonderfully well pleased to note a very large increase in business over that of the preceding year. In 1915, our trade was at least 50% more than that of 1914. We expect to make another big gain in trade in 1916.

Grow a little field of Dwarf Essex Rape in 1916 for the finest of hog pasture. Rape seed is cheap and rape makes lots of succulent feed. Hogs and lambs do well on rape. They now bring good money. See the point?

NORTHERN OHIO ACCLIMATED SEED

One of the most desirable qualities which a variety of corn or soybeans may have is early maturity. To get an early-maturing crop of soybeans or corn the farmer must of course plant seed selected from an early-maturing crop. That, however, is not the whole story. If one takes seed from a crop grown in a warm favorable climate and plants it in a cooler, more northern climate, the crop from it will act very much as if it did not wish to ripen at all. It is not acclimated to cooler more adverse conditions.

Now northern acclimated seed will produce a very satisfactory crop if planted farther south, but southern-grown seed does not do nearly so well when planted to the north.

We are located up in that part of north-eastern Ohio, which judged by careful records for many years, has the coolest shortest growing season of any part of the State. Our corn and soybean varieties in order to ripen well must be of very early-maturing strains. Our pedigreed calico corn comes from a strain of corn which has ripened seed on the same farm in Atwater, every year for 30 or 35 years back. The majority of the other varieties of seed corn which we sell are of northern Ohio acclimated stock, as well as our calico corn. We know how important it is to the success of our customers in New York, Michigan and other states, having like climatic conditions, to have northern-acclimated seed corn and soybean seed of early-maturing strains of varieties. So we endeavor to get as much of our seed corn and soybean seed as possible from growers in our own locality.

Mammoth Yellow soybean seed and other late varieties of soys as well as the large late-maturing varieties of ensilage corn we have to purchase, of course, in the South, because the season is much too short here to give them time enough in which to properly mature a crop.

WARRANTY

Our warranty is the Square Deal. We give in our seed shipments the non-warranty adopted by practically all of the best seedsmen in America, but this is only used by seedsmen to protect them from possible unreasonable and perhaps ruinous legal persecution through personal spite. No sensible seedsman will knowingly ship out seeds which will hurt his business. We are shopping out a quality of seed that is building up a big business for us.

DIRECTIONS

Write your name, postoffice address and other particulars as distinctly as possible in your correspondence with us.

Use Order Blanks if possible. Don't forget to give correct name of freight or express station. Is your R. R. station a prepaid one?

Order Seeds Early. This is the only way in which you can give us a fair chance to serve you as well as we would like to do it.

Loss By Freight. In case of loss or damage by freight, have freight agent note same on freight bill before paying it. Damages can then be collected from them.

Atwater is on the C. & P. R. R. and Cleveland and Alliance Electric Line, about half-way between Alliance and Ravenna. Adams and Wells-Fargo express offices are here. Good Pennsylvania R. R. train service and electric cars every hour from both north and south. Seed Farm is located one-half mile west and one mile south of Atwater R. R. depot. From February 1st to June 1st, 1916, during the rush of the seed trade, our office and warehouse will be in Atwater Elevator, located next to the C. & P. R. R.

Terms of Sale: Cash with order. We accept drafts, P. O. orders, Express Co. orders and checks at their face value. Do not send any currency in letters; it is not sensible to do so. If satisfactory reference is furnished to us we will ship by freight, sight draft, attached to bill-of-lading or by express C. O. D., customer to pay all expense charges.

Prices: On account of the fluctuation in prices of farm seeds, we give no prices in catalogue but publish a price list, which we change to suit the market. We are very much pleased to mail price lists to all who request us to do so. Prices are subject to change without notice

If you have any bad wet spots in your fields which need to be underdrained haul the tile out there now while the ground is frozen. Then dig the ditches and lay the tiles early in the spring without delaying your regular field work.

Lime Your Land

WITH

“Tiger Brand”



Showing result of lime on alfalfa.



Clover field limed with Tiger Brand.

What Lime Does for the Soil

Government experts, farm paper editors and other authorities on farming have for years urged the use of lime on farm lands. Every practical farmer who intelligently follows their advice has been rewarded by better and bigger yields.

Makes Sour Soil Sweet. Many crops gradually starve when placed in sour, acid soils. Certain processes necessary to plant growth cannot take place in acid soils. Lime neutralizes the acid and makes sour soil sweet again.

Saves Fertilizer. Lime is not a fertilizer itself but potash, ammonia, phosphorus and certain other fertilizers are often found in the soil in such combinations that lime is needed to release them and put them in shape for the plant to use. Many lands are rich enough in plant foods and only need lime to make that food usable.

Helps Plants Gather Nitrogen. Clover, alfalfa, cowpeas and similar crops are good for soil because they gather nitrogen and store it for the crops that follow. Lime greatly increases the growth of clover, alfalfa, etc., and at the same time causes them to gather nitrogen much more rapidly.

Improves Soil Texture. Rough, cloddy, clay soils gradually break up and mellow when lime is added. Sandy soils are made more compact and hold moisture better.

Tiger Brand

The good lime will do your land depends on the quality of the lime, its freedom from foreign matter, and the percentage of Calcium or Magnesia in it.

Tiger Brand Lime Products are manufactured in the largest lime plant in the world. They have a reputation among farmers for purity and strength. Absolutely no refuse or kiln sweepings are ever allowed to get into Tiger Brand Lime or Limestone.

Tiger Brand Ground Quick Lime

Ground from selected lumps of fresh burned quick lime. Packed in 75 lb. paper sacks or 150 lb. jute sacks.

Tiger Brand Ground Hydrated Lime

Manufactured from the same high quality lump lime but it is thoroughly slaked before grinding. Moisture does not affect it, it will not swell or burst bags and can be kept indefinitely.

Packed in 40 lb. paper sacks or 100 lb. jute sacks.

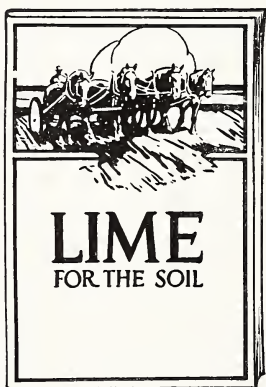
Lime Products

Tiger Brand Ground Limestone

It is always shipped absolutely *dry*—no water to pay for.

Shipped in bulk or in jute sacks 100 lbs., or paper sacks 100 lbs.

Get Our Free Lime Book



24 pages illustrated

What Lime Does
For Soil—

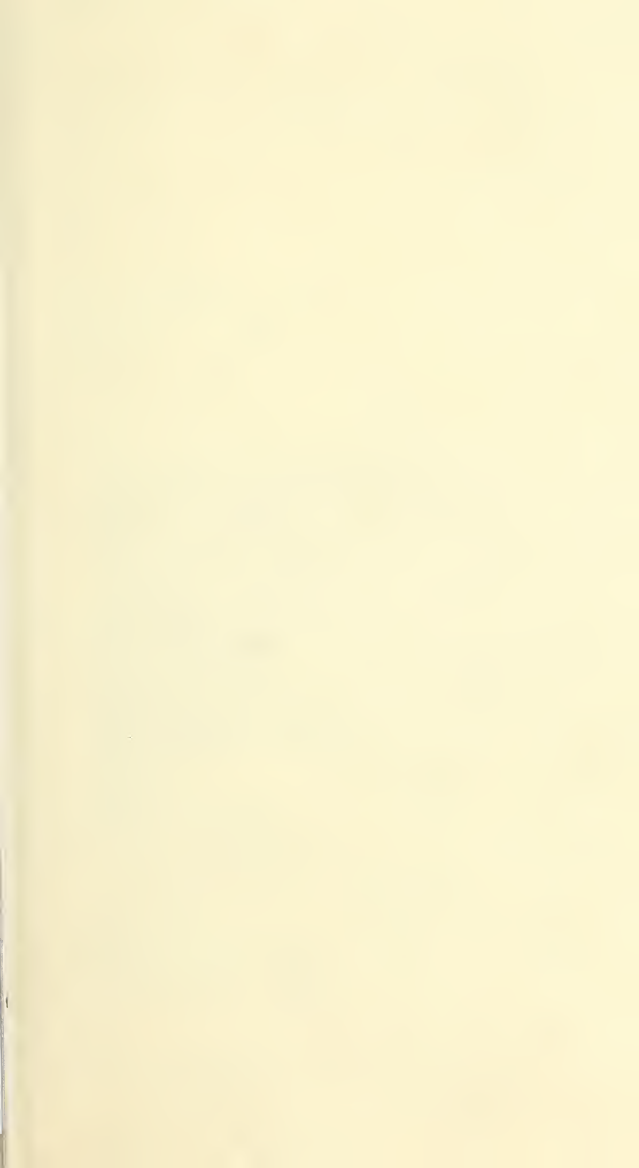
When Does Soil
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What Crops Are
Benefited—

What Kinds Of
Lime To Use

When And How
To Lime

*Drop Us a Postal for book and
Prices on Any of Above Tiger
Brand Products.*





TIGER SOWER

for Lime and Fertilizer

THIS sower spreads lime or fertilizer quickly and thoroughly so that it comes in contact with all the soil.

It is strongly built with heavy wheels and cold rolled steel axle. Provided with agitator and beater. Metal parts which touch lime are brass and will not rust. Price \$35.00 F. O. B.

Factory, Louisville, Ky.

TIGER BRAND PRODUCTS

MANUFACTURED BY

**The Kelley Island Lime &
Transport Company**

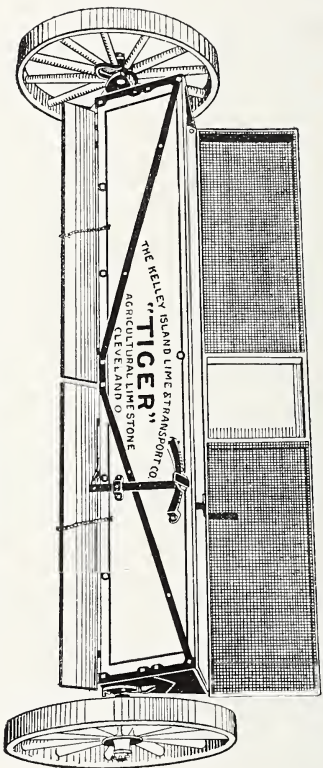
CLEVELAND, OHIO

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ATWATER . . . OHIO

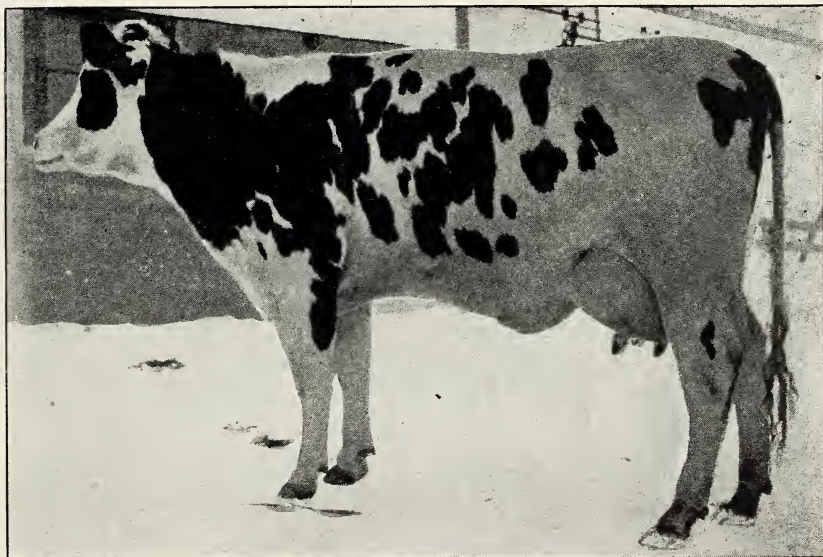
THE TIGER SOWER



Sower showing top of hopper showing screen top.

THE WHOLE SYSTEM OF SUCCESSFUL AGRICULTURE
IN AMERICA RESTS ON THE BASIS OF
LARGE SUPPLIES OF LIME
AND HUMUS IN
THE SOIL.

Make your plans to grow more legumes than ever you have grown in previous years. Buy seed for these crops early in the winter. It is false economy to wait until spring.



K. K. S. V. CORA NO. 214,140

This wonderful Holstein makes a great record while eating soybean-corn ensilage. Do you feed any to your cows?

PLEASANT HILL HERD HOLSTEIN-FRIESIAN CATTLE

Poland; Herkimer Co., N. Y., Dec. 31, 1915

MR. WM. McD. STONE,

Atwater, Ohio.

Dear Sir:

I am sending photo of my two-year-old heifer, K. K. S. V. Cora No. 214,140, who has the second largest Junior two-year-old record of the breed. She has an A. R. O. record of Butter seven days 26.61 and Milk seven days 397.1. She also won first prize money in 1914-5 from the H. F. A. Association. This heifer was fed on corn and soybean ensilage while in test and will say that the seeds I have had from Mr. Stone have proven first-class in every respect.

Yours truly,

Per E. R.

....W. D. ROBENS

Wm. McD. STONE

SOYBEAN AND
CORN SPECIALIST

ADVISED AND
PORTABLE CO.

"THE CAUSE"
OF COLLECTED SOYBEAN ROOT
DISEASES AND THE REMEDY